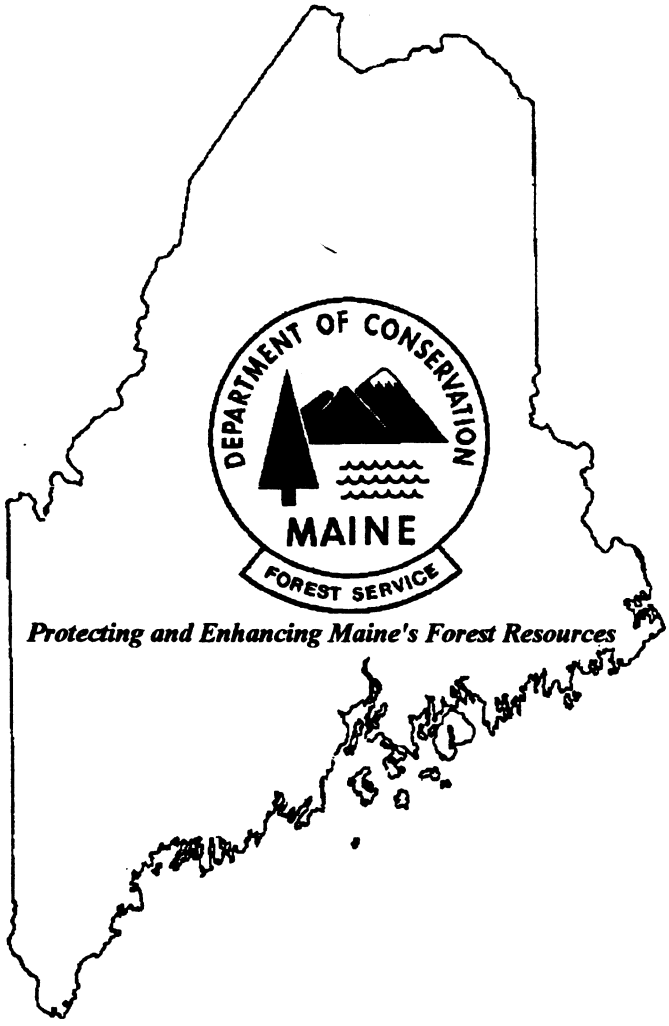
Forest & Shade Tree Insect & Disease Conditions

for Maine

A Summary of the 1995 Situation



Insect & Disease Management Division
Summary Report No. 10
March 1996

Maine Forest Service
MAINE DEPARTMENT OF CONSERVATION
Augusta, Maine

MAINE

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This summary has been compiled and edited by **Richard Dearborn** and **Clark Granger** from input received from the Insect and Disease Management staff and many cooperators. State Entomologist, **Dave Struble** contributed entries and proofread the final draft. **Dick Bradbury**, **Henry Trial, Jr.**, **Don Ouellette** and **Charlene Donahue** of our staff either wrote items or otherwise contributed to the compilation process. Our regular field staff, **Mike Devine**, **Jody Connor**, **Skip Cram**, **Mike Skinner**, **Grayln Smith** and **Dave Stewart** provided us with information and records on various insects and diseases and assisted on several intensive state and federal projects. Thanks go also to the federally funded seasonal staff: **Joy Leavitt**, **Kathy Murray**, **Daniel Cram**, **Laurie Mann**, **David Rhinebolt**, **Travis Willey**, **Forrest Briggs**, and **Wayne Searles** who worked on the Forest Health Monitoring Program while **Rex Waite** and **Jeff Wilder** continued their work on the White Pine Blister Rust Program.

A special debt of gratitude goes to **Betty Barry** who had to take information from a number of sources in various formats, including roughly written notes and bring these into a cohesive computer generated product that could be proofread. Credit is also due to both Betty and **Dot Arbour** who are keepers of the mailing list and who prepare this summary for mailing.

Our thanks go to many other administrative and field staff in the Maine Department of Conservation who facilitate much of our work and to cooperators associated with the USDA-Forest Health Protection, USDA-APHIS, Maine Department of Agriculture, University of Maine at Orono, and cooperators in other New England States and Maritime Provinces of Canada.

We would also like to extend our appreciation to those in the business sector and individuals who came to us over the year with questions, comments or problems for diagnosis. Through our efforts to address each of these client needs we were better able to serve others.

Without the generous support of all, this effort would have fallen far short of its goal.

Suggestions for Quick Access to Particular Items

We have somewhat modified and refined the format which was used in last year's report. The Table of Contents along with the "Highlights" section and the Index should still provide most of the help you need in narrowing down your search for items of particular interest. However, we have again provided our very brief one-point assessment table for damage level trends for quick review for most of our common problems (Table 1, p. 9). You still may wish to scan the entire report to pick up **new items** of interest as well. Keep in mind the following when scanning for particular problems:

- **Insect problems** associated with both trees and shrubs in forest, plantation, shade tree and ornamental situations are now broken down into only two categories. All **softwood (conifer) insect pests** are grouped in Section A (p. 12). All **hardwood insect pests** are in Section B (p. 21).
- **Miscellaneous insects and other arthropods of medical, nuisance or curiosity significance** have their own section (p. 39) which also includes a table showing the variety of **public assistance** requests received by I&DM.
- **Tree diseases and Injuries** are listed alphabetically in a separate section beginning on page 43.

We hope that you will find these suggestions helpful. Any comments for further improvement are welcome.

FOREST & SHADE TREE INSECT & DISEASE CONDITIONS FOR MAINE
A SUMMARY OF THE 1995 SITUATION

Comments from the State Entomologist

When writing these comments for last year's report, I referred with some pride to the accomplishments of the I&DM Division and its cooperators in the midst of the general budgetary constraints of the recent past. The same can be said for 1995 with the recurring budgetary adjustments resulting from depressed state revenues and the Productivity Realization Task Force (PRTF) program review process. These situations generated an uncertain and distracting backdrop. Nonetheless, we successfully addressed the relevant forest resource issues that arose.

Although the I&DM Division is operating with a reduced budget and is facing personnel reductions as staff retire and are not replaced, we remain committed to protecting the forest, shade and ornamental tree resources of the state from significant insect and disease damage, preserving the overall health of the resource, and providing pest management and damage prevention and control for homeowners, municipalities, and forest landowners and managers. This is our mission.

If you study the organization chart on the inside cover of this summary, you will note that the structure of the I&DM Division has changed somewhat. This change is in response to direction provided by the PRTF for agencies to flatten organizational structure. We are still fine-tuning operational roles to respond to the new team-style organization structure. However, despite the changes in organizational structure, we are actively maintaining the functional programmatic linkages that have enabled us to accomplish our legislative mandate in the past. The success of this exercise will be measured by the level of service that our clients receive.

As with the past organizational structure, certain staff have primary responsibility for certain activities or areas. In reality, the means by which we accomplish our tasks is nowhere nearly so simple. Most activities and projects require the involvement of a cross section of Division staff. They often also involve the assistance of a broad range of outside client/cooperators.

The example that comes to mind is this past year's program to address the browntail moth situation in the Casco Bay Region. Activities included conducting survey and assessment of the pest and its impacts, developing remedial management strategies, providing technical advice and assistance to the affected public, providing project oversight assistance on local chemical control efforts, and conducting research and initiating pilot projects to test new management options.

None of these activities were the province of IDM alone. We had assistance from our counterparts in other state agencies and the federal government. Local residents working through their island associations, municipalities, nonprofit organizations, or as individuals provided resources that we otherwise would not have had. We got professional support from the medical community, licensed pesticide applicators, and arborists. The list could go on....

That we collectively were successful in addressing the browntail moth situation is confirmation of the value of our collaborative effort. However, the larger success story is that the browntail moth example is the rule, not the exception. There are many instances of this cooperative approach to addressing situations, the level of involvement being determined by the scope of the problem and the resources available.

Without such support the I&DM Division could not accomplish what we do. Although new technologies are often touted as the enablers of greater productivity, such new tools do not guarantee that activities are appropriate or programs successful. The continued relevance and utility of the I&DM program depends on the involvement of our clients and cooperators. Having you involved reduces the likelihood that we will wander off on a tangent. Our current situation reflects the success of this approach.

While this annual summary captures many of the activities conducted as part of I&DM's core functions, it is not an exhaustive summary of Division activities and accomplishments. The activities conducted by Division staff

in support of other operations, both within the Maine Forest Service and outside, are not well captured. And although we try to acknowledge you, our client/cooperators, the few words written here do not convey the extent of our reliance or express our appreciation for your contribution.

These Forest & Shade Tree Insect & Disease Conditions Reports serve as one of the primary vehicles for relaying general information from us to you; it is critical that they be useful. We sincerely hope that you will read them, use them, and keep in touch with us regarding information or suggested improvements so that they continue to meet your needs.

Personnel Notes

Edwin T. Wadleigh (Sept. 2, 1924 to April 16, 1995) - As our part-time laboratory custodian, Ed was known by most of our division staff and many others throughout state government. He came to help us out in June of 1958 and stayed until he retired in poor health in April of 1995. Ed had also worked for twenty five years as a radio technician with the state police and for a private woodworking firm. Ed was one who was proud of his work, whatever he did, and saw to it that any potential problems were rectified or addressed immediately. He will be missed.

Cooperative MFS/USFS Projects

Forest Inventory & Analysis (FIA) Decennial Survey

The I&DM field staff continued an active role in assisting the FIA unit of the U.S. Forest Service in conducting its decennial survey of Maine's forest resources throughout most of 1995. The FIA resurvey of Maine's forests began in 1994 and assessment crews remained active through 1995 and into early 1996. The MFS has placed a high priority on timely completion of the resurvey and I&DM devoted considerable resources toward this goal. Results of the FIA survey will determine the status and trends of Maine's forest resources and these results will be an important factor in the formulation of forest resource policy.

Our field crews spent considerable time in 1995 prelocating FIA plots and searching for "lost" plots in order to speed plot assessment by FIA crews. Field Unit FIA activities began in January and centered largely in northern and western Maine. Fire Control rangers (MFS) from two northern and one central region district were trained in FIA procedures by I&DM staff and also assisted in plot location. Maine Forest Service crews searched for plots that were missing the original survey photos and for plots that FIA crews had attempted to locate in 1994 but had failed to find. The MFS crews also prelocated Piscataquis County plots for assessment during the summer of 1995. This prelocation effort significantly sped the assessment of Piscataquis County plots by FIA crews. MFS crews continued to locate "lost" and attempted plots throughout the summer and early fall as other commitments permitted. Our assistance to FIA ended in late October having located several hundred plots in 1995.

As in 1994, I&DM staff assisted the Forest Health Protection unit of the U.S. Forest Service in training FIA field crews in identification of a group of indicators of forest health on FIA plots. These indicators were developed cooperatively by FIA, I&DM, and our state counterparts in New Hampshire and Vermont to facilitate linking various regional pest incidence, FIA, and National Forest Health Monitoring program data sets. In addition to training the I&DM Division provided quality control oversight for this cooperative effort.

National Forest Health Monitoring Program (NFHM)

The I&DM Division continued as a cooperator in the NFHM program in 1995. The program expanded somewhat in 1995 with the addition of Pennsylvania and West Virginia bringing the total number of participating states to 19. The NFHM program was begun as a cooperative effort between the U.S. Forest Service, the EPA and the states and was designed to annually collect and evaluate nationally standardized data on the health of the nation's forests. The EPA has largely withdrawn from the program resulting in significant funding shortfalls for 1996 and the future. Attempts are currently being made to stabilize available funding in order to insure continuation of past efforts while continuing program expansion to all states. However, due to funding shortfalls, plot remeasurement scheduled for Maine, the rest of New England, and several other cooperating states in 1996 have been suspended.

Maine successfully completed remeasurement of the 137 plots located within the state in 1995. Seventy five percent of plot remeasurements in 1995 were measurement type three (Mt 3), meaning that the full suite of measurement rather than solely crown assessment variables, measurement type two (Mt 2), were collected. The remaining 25 percent of plots had been measured as Mt 3 in 1994 and were remeasured as Mt 2 in 1995. Basic long term core information collected by the program (annual tree health measurements, land use patterns, cover type information, and forest inventory data) was measured in Maine in 1995. However, three new variables added to the suite of measurements in 1994 (photosynthetically active radiation, and vegetation and lichen assessment) were suspended in 1995, largely due to a lack of available EPA funding. With the completion of the 1995 measurements Maine has completed a full cycle of assessment and has new land use, cover type, and forest inventory information to compare to the original measurements made in 1990.

The field measurement costs of the 1995 NFHM Maine plot measurements were significantly lower than in 1994. Remeasurement proceeded very smoothly due to excellent weather, insignificant lost time due to hardware or software problems, and excellent effort on the part of largely veteran crews (six of eight crew people had at least

one year of plot experience). Training cost were up for NFHM crew people but this increase was offset by a reduced involvement in training permanent I&DM Technicians. Supervisory and other overhead costs were also somewhat lower.

The MFS also continued to use the NFHM plot network as a vehicle to enhance accumulation of additional insect and disease data for ongoing survey and evaluation efforts. Checklists of insect and disease problems associated with the forest type of each NFHM plot were completed for each plot visited in 1994. We continued to improve field guides and held training sessions designed to improve the ability of NFHM crews to detect and evaluate a wider range of pests and problems encountered during annual plot measurements.

North American Maple Project -NAMP

Since its beginning in 1988, the NAMP program has provided state-specific and pooled data sets and evaluations regarding the health of the maple resource in 4 provinces and 10 states from Nova Scotia to Minnesota. The Maine data are obtained from nine sets of paired plots (a total of 18 plots) from the western central portion of the state. Data collected during the summer of 1995 are presently being analyzed.

Based on the analyses in the most recent (February 1996) interim report, "Temporal Change in Sugar Maple Crown Condition in Maine from 1988-1995" by Douglas Allen and Andrew Molloy, sugar maples in Maine are healthy.

- Dieback in sugar maple plot trees averaged 6.5%, and showed no significant difference in levels of dieback from 1988-1995.
- Transparency (an index of total leaf area) averaged 10.3%. This value was not significantly different from values measured when the program began in 1988. However, unlike dieback which remained stable across the period, transparency has varied between years in response to current stresses. All plots have remained well within the healthy range across the time period.
- Average annual natural mortality of sugar maples for the period 1989-1995 was less than 1% and was lower for sugar maples than for other species on the plots.
- Although tree condition in Maine is somewhat better than the average for the total plot network across eastern North America, results are very similar.

During the 1995 summer growing season Maine experienced severe drought conditions over much of the state. The resultant impacts of the water shortage may be demonstrated in 1996 as thinner crowns, increased dieback, or outright mortality if trees were sufficiently stressed. Another concern is that these trees may be exposed to defoliation while in the current weakened state. In this scenario the impacts of the combined stresses could be many times greater than would result from either drought or defoliation alone.

Under the aegis of this program the U.S. Forest Service published the annual update "Condition of Sugar Maple 1994" and reprinted the popular "Sugarbush Management: A Guide to Maintaining Tree Health" (see p. 7). Copies are available through this office.

Competitive Focus Funding Grants

Determination of the Impact of Hemlock Looper, Lambdina fiscellaria (Guen.), and L. athasaria Defoliation on Eastern Hemlock, Balsam Fir, and White Spruce Tree Health - The final report from this multi-state study was published in 1995 (see p. 7). Results show that the impact of the outbreak was less severe than was expected, and that it was not uniform across the infested area.

- Tree mortality occured on approximately 10% of the plot area assessed and averaged less than 2% of the trees.
- About 7% of the hemlock and 11% of the fir regeneration was killed.

- While defoliation was necessary to produce high levels of mortality, tree mortality was not well correlated with severity or duration of the defoliation. Additional stressors such as harvest disturbance drought and poor sites were also usually involved.

MFS Insect and Disease Historical Database - The I&DM Division was awarded a cooperative grant by the USFS in 1994 to develop and test an electronic relational database for the MFS historical insect and disease data set. The purpose of this database was to facilitate access to the historical data to 1) define the biodiversity of areas 2) substantiate predictive models 3) show spatial/temporal distribution of species and 4) describe population trends. This project is underway.

- With the Canadian Forest Service-Maritime Forest Research Centre we are developing mechanisms and management protocols to share and maintain established, tested hierarchial codes and nomenclature from the CFS-FIDS project.
- The prototype database is being generated.
- Data entry and database challenge activities are planned for 1996.

A Reevaluation of Forest Regeneration in Spruce Budworm Damaged Stands Within Baxter State Park - The USFS awarded the I&DM Division a grant in 1995 to assist assessing the composition and condition of advanced regeneration in stands severely damaged by spruce budworm during the past outbreak. The resulting report will compare the present stand composition to the composition of the overstory prior to the budworm outbreak and will include an evaluation of current regeneration and surviving overstory health. Field work on plots will start in 1996.

Brown (= Black) Ash Health Evaluation

In response to indications of significant decline in the health of Maine's brown ash resource, in 1993 the I&DM Division entered into a cooperative agreement with the USFS to define the extent of the decline syndrome and to investigate associated site and stress factors. General project objectives included:

- Evaluating the health of brown ash in Maine, and determining the extent and severity of the observed decline.
- Investigating correlations of various site factors with these events.
- Investigating contribution of specific stressors as predisposing, exacerbating and/or causal factors.
- Providing the owners and users of Maine's brown ash resource and the interested public with the findings of these investigations.

All field work and analyses associated with the original project objectives have been completed. However, the initial evaluation of tree-ring growth patterns conducted by the University of Maine, College of Natural Resources, Forestry, and Agriculture have prompted more elaborate analyses, to better define the relationship between weather, tree growth and dieback episodes. Although all of the field work associated with this ancillary evaluation is complete, the data analyses are still in progress.

During 1995, the I&DM Division revisited approximately 60% of the original brown ash plots to reassess the current level and trend in brown ash stand condition. The plots associated with the ancillary University study are a subset of this sample. Although the analyses of these data are not complete, preliminary results indicate that both tree condition and growth rates for brown ash across the state have improved significantly. The results of these analyses will be published during 1996 as a sequel to the original (1994) I&DM evaluation, "Forest Health Monitoring Evaluation: Brown Ash (*Fraxinus nigra*) In Maine, A Survey of Occurrence and Health", I&DM Division, Technical Report No. 33 by H. Trial, Jr. and M.E. Devine.

Management of Root Sprouting in American Beech to Enhance Numbers of Clones Resistant to Beech Bark Disease (*From a progress report submitted by Dr. David R. Houston, Principal Plant Pathologist with the USFS*).

This cooperative study between the USFS, the Maine Bureau of Public Lands and the Maine Forest Service, was established to assess the potential of two harvesting systems (clearcutting vs. partial cutting) conducted during two seasons (winter vs. summer) to manage the subsequent initiation and survival of root sprouts from root systems of cut or standing trees resistant or susceptible to beech bark disease. The site for this study was selected and the study began in 1989 on the Maine Public Reserve Lot on the east side of Seboeis Lake in T4 R9. Initial plot measurements were taken prior to harvests. These harvests were conducted in the winter-late spring of 1991.

Final field work associated with this study was finished during the summer of 1995. This final season's work was designed to determine impacts (if any) resulting from the disturbance associated with the plot visits during the study. Crews established 8 new plots within each of the 5 treatments but outside the original study areas. These plots were identical to the original plots that have been measured throughout the study. All beech sprouts and seedlings in the plots were evaluated and tallied. Crews also measured the amount of light available to regeneration in each of the treatments.

Data analyses are well underway and the final project report is anticipated during 1996.

Publications

A file of publications is maintained by the I&DM Division (MFS) on a variety of subjects relating to the protection of Maine's forest resources from pests. This file contains publications of our own plus many from other sources as well. Besides a number of fact sheets we still have copies of two of our more popular booklets: Bull. #25 - Field Book of Destructive Forest Insects (1980) and Bull. #10 (5th Revision) - The Planting and Care of Shade Trees (1985). A number of our Technical Report series, now numbering 36 (see list p.), are also still in stock for more detailed information on specific subjects. Extended conditions summary reports, such as this one, have been issued annually since 1987 (for the 1986 season). A limited number of sets are available.

In addition to published reports our staff continues to give talks to a variety of groups including schools and to provide items of interest to the news media and various association newsletters as well.

The following items were published over the past year by I&DM staff:

Granger, C.A. and Geneva Duncan. 1995 (May). Integrated Crop Management Schedule for the Production of Christmas Trees. MFS, I&DM Div. Circular No. 11. A pocket fold-out.

Insect & Disease Management Division. 1995 (March). Forest & Shade Tree-Insect & Disease Conditions for Maine - A Summary of the 1994 Situation. MFS, I&DM Division. Summary Report No. 9. 65 pp. Compiled and edited by R.G. Dearborn and C.A. Granger.

—— 1995. Forest & Shade Tree-Insect & Disease Conditions for Maine. 8 issues from April 12 through September 13. MFS, I&DM Div. Compiled and edited by R.G. Dearborn and C.A. Granger.

Bradbury, R.L. 1995 (May). Efficacy Trials of Foray 48B Against Early Larval Instars of the Browntail Moth, *Euproctis chrysorrhoea* (L.). MFS, I&DM Div. Tech. Rpt. No. 35. 7 pp.

Trial, Jr., H. and M.E. Devine. 1995 (Nov.). The Impact of the Hemlock Loopers, *Lambdina fiscellaria* (Guenée), and *L. athasaria* (Walker) on Eastern Hemlock and Balsam Fir in New England. MFS, I&DM Div. Tech. Rpt. No. 36. 24 pp.

Our I&DM staff also cooperated with other agencies to produce the following items:

Allen, D.C. and A.W. Molloy. 1996 (February). Temporal Change in Sugar Maple Crown Condition in Maine from 1988 - 1995. North American Maple Project. Syracuse, N.Y., SUNY-CESF. 54 pp.

Allen, D.C. et al. 1995 (August). North American Maple Project - Seven Year Report. 75 pp.

Cooke, R.R., D.C. Allen, D. Lachance and A.W. Molloy. 1995 (June). Condition of Sugar Maple 1994. USDA/FS and Canadian F.S. Foldout Leaflet.

Houston, D.R.; D. C. Allen and D. Lachance. 1990. (Reprinted 1995). Sugarbush Management: A Guide to Maintaining Tree Health. Gen. Tech. Rep. NE-129. USDA/FS. 55pp.

Maine Forest Service. 1995. Forest Trees of Maine. Twelfth Edition. 114 pp. Copies may be purchased for one dollar each (please make checks payable to: Treasurer, State of Maine) from: Maine Forest Service, Department of Conservation, 22 State House Station, Augusta, ME 04333-0022 ATTN: Judy Tyler. A limited number of copies in a waterproof (Tyvek) format for field use are also available for five dollars each.

University of Massachusetts Cooperative Extension Service. 1994 (March). 1994 New England Management Recommendations for Insects, Diseases and Weeds of Shade Trees and Woody Ornamentals. Compiled and edited by R.D. Childs and M. Castonguay, with assistance from the Maine Forest Service and other New England state agencies. 248 pp., 12 color plates+. A 195 page 1995 Update for these recommendations was prepared by R.D. Childs and Kathleen R. Hickey.

Forest and Shade Tree Insect and Disease Conditions for Maine

Highlights of the 1995 Season

Problems affecting forest and shade tree resources across the state in 1995 included surprises interspersed with the routine. Some of the more spectacular events in Maine, and the northeast as a whole, this past year were climatic in nature and ranged from ice damage to drought to severe winds. Insect and disease problems were more often subtle and regional in nature but still of concern.

While gypsy moth and hemlock looper subsided ash leaf and twig rust and spruce beetle came to the front. Although the spectrum of other problems encountered by our staff over the season exhibited its usual diversity (see Table 1 for highlights), a few pest populations took unexpected turns. Insects in the sapsucking category seemed to do well in 1995 and aphid/adelgids, scales and plant bugs were commonplace. What appeared to start out as high populations of the variable oakleaf caterpillar plunged about mid season while numbers of the associated orangehumped mapleworm held on. The birch casebearer/leafminer complex, fall cankerworm, white pine weevil and yellowheaded spruce sawfly stood out due to population increases and greater roadside and urban visibility. Browntail moth, yellowjackets, ticks and insect induced rash again dominated the area of public health issues and carpenter ants held the number one slot among household problems.

Introduced species are often cause for concern and can achieve news level notoriety. So far the Asian gypsy moth, common pine shoot beetle and hemlock woolly adelgid have stayed south of Maine borders. Other introductions such as the butternut canker, columbine sawfly, Asian lady beetle and viburnum leaf beetle, however, have showed up in numbers in new areas in Maine. In 1995 the rose stem girdler showed up as a problem in rugosa rose for the first time in Maine.

In retrospect the 1995 season was fairly typical. We have tried to present the situation as we experienced it. We hope that you find the enclosed material useful and at the same time as entertaining as we have. We have consolidated entries to enhance their readability yet have included enough information to allow land managers to make sound management decisions. We hope you enjoy it.

Table 1. Damage level trends for 1995

Those of special significance

Aspen Leafroller/tiers.....	→*	<70,000 A.
Balsam Fir Sawfly.....	→	50 A.
Balsam Shootboring Sawfly	↘	local
Balsam Twig Aphid	↗	plantations
Birch Skeletonizer	↘	low & scattered
Brown Ash Decline	↘	high
Browntail Moth	↗	local, Casco Bay, <2420 A.
Bruce Spanworm	→	<10,000 A.
Bud Abortion (balsam fir) ..	→	low
Butternut Canker	↑	15 counties
Cone Buds (balsam fir)	↘	low to moderate
Dogwood Anthracnose	→	York County
Drought	↗	moderate/high
European Larch Canker	→	static
Fall Cankerworm	→	high, Aroo Cty. boxelder only
Gypsy Moth	↓	<500 A.
Hardwood Decline	↗	180,000 A. high, north
Heat Injury	↓	low
Hemlock Looper	↓	low/endemic
Introduced Pine Sawfly	↘	low
Late Spring Frost	→	low
Meadow Vole Damage	↘	local
Pinewood Nematode	→	local
Rd. Salt Spray/Pooling Damage	↘	low
Satin Moth	↗	2,260 locally high
Variable Oakleaf Caterpillar	↘	11,300 A.
Viburnum Leaf Beetle	↗	locally high
Winter Browning	↘	low
Yellowheaded Spruce Sawfly ...	→	high

Perennial Problems

Air Pollution	→	low
Alder Flea Beetle	→	locally high
Annosus Root Rot	→	low
Arborvitae Leafminer	↗	local
Ash Anthracnose	↗	low/moderate
Ash Leaf and Twig Rust ...	↑	low/high locally
Balsam Gall Midge	→	low
Balsam Woolly Adelgid	→	locally high
Beech Bark Disease	→	high
Birch Casebearer	↗	high, roadside
Birch Leafminer (*Messa*) ..	↗	moderate
Boxelder Canker	↗	moderate
Coral Spot Nectria Canker	→	low
Cristulariella Leaf Spot	→	very low
Dutch Elm Disease	→	high
Eastern Larch Beetle	↘	low & local
Eastern Tent Caterpillar	↗	locally high
Fall Webworm	↗	higher north
Fir-fern Rust	↑	high
Forest Tent Caterpillar	↗	<100 A.
Horse Chestnut Leaf Blotch	→	moderate
Larch Casebearer	→	high, local
Larch Sawfly	↗	locally high
Large Aspen Tortrix	→	low
Mountain Ash Sawfly	→	high, local
Oak Leaftier/Skeletonizer	→	low
Pear Thrips	→	low
Pine Leaf Adelgid	↗	locally high on pine
Pine Needle Rust	→	low
Pine Spittlebug	↗	local
Pitch Mass Borer	→	local
Porcupine Damage	→	locally high
Rhabdocline needle Cast	→	moderate
Saddled Prominent	→	low
Saratoga Spittlebug	→	local
Scleroderris Canker	→	low
Sirococcus Shoot Blight (Larch)	↗	moderate
Spider Mites	→	high, local
Spruce Beetle	↗	high, coastal <1800 A.
Spruce Budmoth	→	low/moderate
Spruce Budworm	→	low/endemic
Stillwell's Syndrome	↗	local
White Pine Blister Rust	→	low
White Pine Weevil	↗	high

* damage levels: ↗- up slightly; ↘- down slightly; ↑- up sharply; ↓- down sharply; →- stable at level indicated.

Light Trap Survey

A total of 24 light traps were operated during the 1995 season at selected locations throughout the state. This marked the fifty third season for this important surveillance and detection program for lepidopterous forest defoliators. Roughly 25 pests are monitored on a fairly consistent basis and of these twelve are compared annually (Table 2 lists nine of these). The results of seasonal catches are used to supplement data from other surveys such as those for larvae or damage or to compare to pheromone trap catches. Light trap catches are also monitored for new and unusual species, especially in southwestern Maine at South Berwick where an oak-hickory forest type is present (one of the few such areas in Maine) and at Arundel. A general summary of the results of this survey for 1995 can be found in Table 2. Annual comparisons for some pest species have been interwoven into the regular report.

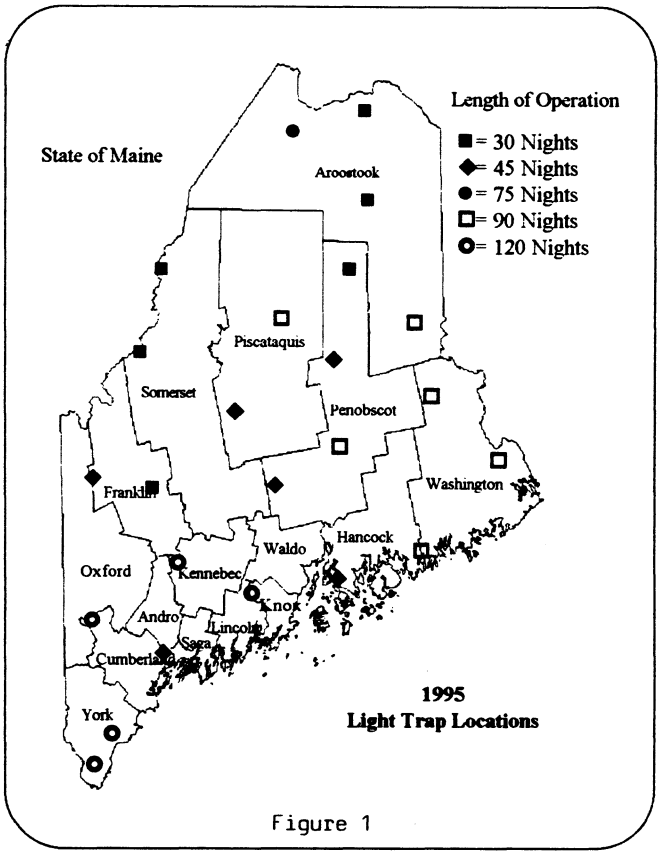

Figure 1

The trap sites and periods of trap operation (Figure 1) were selected to provide optimum measurement of the distributioand abundance of insects affecting the forest resources of the state. Trapping periods target potential forest pests for each specific site and forest type. Traps used primarily to monitor spruce-fir insects were operated throughout the month of July; whereas traps monitoring hardwood insects as well were operated from mid June through July. Special trapping periods were established at some locations for the spring hemlock looper, *Lambdina athasaria* and the fall hemlock looper, *Lambdina fiscellaria.*

Table 2. Comparison summary of light trap survey collections of forest pest species, 1995

	Species								
Location	***Choristoneura conflictana***	***Choristoneura fumiferana***	***Dryocampa rubicunda***	***Heterocampa guttivata***	***Leucoma salicis***	***Lochmaeus manteo***	***Lymantria dispar***	***Malacosma disstria***	***Symmerista spp.***
Allagash	0	2	0	1	0	0	0	27	0
Arundel	12	3	531	0	0	1	1	150	3
Ashland	0	0	0	0	1	14	0	157	2
Blue Hill	5	0	113	5	2	30	0	62	33
Brunswick	0	1	20	0	0	3	0	32	17
Calais	0	0	240	0	2	3	0	28	41
Chesuncook	0	0	51	37	0	62	0	1	20
Dennistown	1	1	1	2	0	5	0	79	0
Elliotsville	2	1	103	0	0	57	0	145	50
Exeter	12	6	7	1	0	6	0	4	15
Greenbush	0	0	48	0	1	11	0	95	10
Guerette	0	0	0	0	9	1	0	18	0
Haynesville	0	0	34	1	1	14	0	64	2
Kingfield	0	0	0	0	0	7	0	95	5
Millinocket	3	4	93	7	0	185	0	75	4
Mt. Vernon	5	2	32	13	0	1	12	192	141
No. Bridgton	2	2	24	0	0	0	0	102	73
Rangeley	13	1	0	1	0	4	0	11	2
Shin Pond	0	0	1	1	0	15	0	217	26
So. Berwick	0	0	276	1	0	4	23	195	5
St. Aurelie	0	0	0	0	0	0	0	15	0
Steuben	0	0	56	3	5	3	0	11	13
Topsfield	0	1	133	7	12	50	0	40	152
Washington	2	0	181	0	0	17	0	41	322
Total Moths	57	24	1,944	80	33	493	36	1,856	936

INSECT Problems Associated With Trees in 1995

(A) Softwood Insect Pests

Adelgids (various) - These close relatives of the aphids are often incorrectly referred to as aphids. Adelgids are generally considered more serious tree pests than aphids and are more difficult to control as well. More than ten species of adelgids occur in Maine. Three of these; the **balsam woolly adelgid**, **eastern spruce gall adelgid** and the **pine bark adelgid** complete their entire life cycle on a single host. Most if not all of the others require two conifer hosts with a species of spruce being the gall bearing host. Among this second group it is the **Cooley spruce gall adelgid** and the **pine leaf adelgid** which generate the most concern, primarily in regard to the non spruce host. The infamous **hemlock woolly adelgid** has not yet been found in Maine.

Many of the adelgid populations did very well in 1995 and damage was often locally heavy.

Aphids (*Cinara* spp. and others) - Aphid populations got off to a good start in general in 1995 and seemed to thrive even through the dry times. We received a number of reports of extremely high numbers of the dark, bead-like *Cinara* aphids dropping from large white spruce in ornamental settings in southern Maine in early June. In several cases in Kennebec County adults and nymphs literally covered the ground and surrounding vegetation and were climbing over the sides of buildings nearby. A "rain" of honeydew which was coating all surfaces beneath the trees was already drawing ants, wasps and yellowjackets. Sooty mold was evident everywhere. High populations were also observed in various plantations across the state. Infestations were often not noticed until trees were covered with sooty mold.

The woolly adults of what appeared to be *Prociphilus americanus* were observed on ash foliage in Kennebec County in 1995. The alternate stage occurs as a root aphid on balsam fir and possibly spruce and may occasionally reach high numbers but the ash stage has seldom been seen here.

Arborvitae Leafminer (a complex of 4 species) - We had thought that populations of arborvitae leafminers were declining but it now appears that numbers of one or more species may be heading in the other direction. Locally heavy defoliation was reported from a number of stands in central and eastern Maine in 1995. A number of these stands exhibited evidence of damage from 1994. Estimating acreage was made very difficult by an extremely heavy cone crop. Winter surveys are no longer conducted but we may be in for heavy defoliation again in 1996 in some stands.

Balsam Fir Sawfly (*Neodiprion abietis*) - This species normally occurs statewide at low endemic levels but high, localized populations have caused noticeable defoliation in coastal Washington County over the past few years. Defoliation acreage has continued to fall from a high of 25,000 acres in 1992 to roughly 2,500 acres in 1993 to 100 or less in 1994 and then to only 50 acres of moderate defoliation in Addison in 1995. Further decline is expected.

Balsam Gall Midge (*Paradiplosis tumifex*) - Populations continued low and spotty in 1995.

Balsam Shootboring Sawfly (*Pleroneura brunneicornis*) - Damage in 1995 was spotty and light. There is speculation that this species has a two year life cycle and that populations in even years are higher than in odd years. We began a study in 1995 to clarify a number of issues concerning the balsam shootboring sawfly and its habits. This information will be used to devise management strategies. Populations may be higher in 1996 than they were in 1995 with damage appearing in late May.

Balsam Twig Aphid (*Mindarus abietinus*) - Populations of this pest of Christmas trees and wreath brush stock rose slightly in 1995 and control was necessary in some plantations.

Balsam Woolly Adelgid (*Adelges piceae*) - No new reports of trunk phase activity were received in 1995 even though the gout phase continues to deform and kill balsam fir in some stands along the coast from Brunswick eastward.

Bark Beetles (various) - Bark beetles have played an important role in accelerating the decline of stressed softwoods in Maine but have seldom been the primary pests that western species have been with a few exceptions. Two of the more notably destructive species in Maine over the years have been the **eastern larch (bark) beetle** and the **spruce beetle**. These are discussed separately.

Surveys to detect new introduced species were conducted in 1995 by Me. Coop. Ext. Serv. personnel in cooperation with the USDA-APHIS-PPQ. No new introductions were reported. This survey may be dropped in 1996 due to lack of funding.

Common Pine Shoot Beetle (*Tomicus piniperda*) - This introduced European pest of pines sometimes called the **larger pine shoot beetle** has not yet been found in Maine.

Conifer Sawflies (various) - Although there are more than fifteen different sawflies which may occur on conifers in Maine only five have caused noticeable defoliation on more than a single tree here and there. During the 1995 season, the **yellowheaded spruce sawfly** dominated the scene. Others which produced noticeable feeding during this period were the: **balsam fir sawfly, introduced pine sawfly, jack pine sawfly** and the **larch sawfly**. All are discussed separately.

Cooley Spruce Gall Adelgid (*Adelges cooleyi*) - Galls of this species are fairly common on Colorado blue spruce around home grounds almost every year. Damage to Douglas fir in Christmas tree plantings continued to be a problem in 1995 as well.

Eastern Larch Beetle (*Dendroctonus simplex*) - This problem remained at relatively low levels in 1995 although stands exhibiting mortality are still very much in evidence.

Eastern Spruce Gall Adelgid (*Adelges abietis*) - This species is probably the most abundant and destructive spruce gall in adelgid in Maine and often causes heavy gall production especially on white and Norway spruce in plantations and ornamental situations. High mortality of new shoots on white and Norway spruce observed in late June of 1995 from scattered locations throughout southern Maine appeared to be caused by this adelgid possibly exacerbated by drought. Heavily infested trees were readily visible from a distance. Several infested large specimen trees around Capitol Park in Augusta were checked in early July. In nearly all cases there was evidence of adelgids covered with white, waxy "wool" at the base of the new growth accompanied by complete or aborted gall formation.

European Pine Shoot Moth (*Rhyacionia buoliana*) - This species continues to be a very local problem on red pine in Maine primarily in Sagadahoc and Lincoln counties.

Fir Coneworm (*Dioryctria abietivorella*) - Tip mining activity by this species was not observed in 1995.

Gypsy Moth (*Lymantria dispar*) - Gypsy moth populations were very low in 1995 and caused no reportable damage to softwoods. See p. 29.

Hemlock Borer (*Melanophila fulvoguttata*) - This opportunist attacks hemlock trees which are under stress for one reason or another and once established can kill trees of any size in a single season. During 1995 our staff were called to investigate causes of off-color and dying hemlock in a number of situations in southern Maine. Most if not all of these involved relatively high populations of the hemlock borer in stressed trees. While infested trees should generally be removed from the site, this may exacerbate the problem in some woodland situations especially where the residual hemlock are or could be placed under stress by such action (catch-22!!?).

Hemlock Loopers (*Lambdina athasaria* and *L. fiscellaria*) - Although both of these species occur in Maine, it is the fall flying *L. fiscellaria* which causes most of our defoliation and is more widespread across the state. The spring flying *L. athasaria* seems to be more of a problem in York and Cumberland counties. Because populations of both species were very low in 1995 we have not included a special report in this summary. As experience has shown that both species perform somewhat differently over time we have included them in separate discussions.

Fall Hemlock Looper (Lambdina fiscellaria) - The recent outbreak of this hemlock looper that resulted in moderate to severe defoliation on more than 350,000 acres from 1989 through 1993 is apparently over. Even though larvae were readily found in 1995 on hemlock and fir samples in central and southern Maine, defoliation caused by hemlock looper was insignificant. No mappable areas of looper defoliation were found during September aerial and ground surveys of new or previously infested areas.

Moth activity was monitored in 1995 at 12 of the light trap locations. Total moth catch in these traps declined from 268 moths in 1994 to 177 moths in 1995 (Table 3). Moth catch has declined each year since the peak of looper activity in 1991.

Pheromone baited traps have also been used to monitor moth activity in recent years. Due to other more pressing Division commitments and because recent pheromone results have not correlated well with population levels and looper defoliation in the following year, pheromone traps were not deployed in 1995.

Egg surveys designed to predict looper infestation levels for the next season have been conducted since 1990 but this survey was canceled in 1995 due to the lack of defoliation, low larval numbers, and reduced moth catch. As the looper outbreak in Maine began declining in 1992 and especially in 1994, egg surveys have tended to overestimate subsequent populations. Egg survey predictive categories used in Maine were developed during a period of expansion in the looper infestation and were accurate during that period. As the infestation subsided, larval survival the next season declined significantly (probably from disease) resulting in overestimates of defoliation based on egg counts.

Spring Hemlock Looper (Lambdina athasaria) - Populations and damage attributable to this species appear to be more or less limited to York and Cumberland counties. Between 1988 and 1990 roughly 2,000 acres of hemlock were heavily defoliated by this looper particularly in and around Sebago Lake. Since that time populations have remained low. Larvae of both *L. fiscellaria* and *L. athasaria* are for all practical purposes identical. Moths however are very different both in appearance and flight habits. We have therefore used light traps to monitor for the spring flying *L. athasaria*. Moth activity was detected in three of the five traps operated in 1995 and rose noticeably in the North Bridgton trap (Table 4). This may portend changing populations in the area which bears watching.

Table 3. Total number of fall flying hemlock looper (*Lambdina fiscellaria*) moths collected at light, 1991-95

	Year				
Location	1991	1992	1993	1994	1995
Allagash	-	9	2	0	2
Arundel	-	-	-	2	-
Calais	5,402	1,416	43	6	6
Chesuncook	46	16	13	145	92
Greenbush	51	6	1	1	0
Haynesville	27	5	0	0	0
Mt. Vernon	32	34	5	1	3
N. Bridgton	93	108	67	22	37
S. Berwick	-	403	286	12	3
Steuben	387	29	4	26	3
Topsfield	142	85	13	13	1
Washington	91	73	35	40	30
Total Moths	6,271	2,175	469	268	177

Table 4. Total number of spring flying hemlock looper *(Lambdina athasaria)* moths collected at light, 1992-1995

Location	Year 1992	1993	1994	1995
Arundel	-	-	10	-
Mount Vernon	2	7	0	5
North Bridgton	81	34	49	152
South Berwick	1	0	6	0
Washington	0	0	0	6
Total No. of Moths	84	41	65	163

Hemlock Woolly Adelgid (***Adelges tsugae***) - This species has still not been found in Maine even though it occurs as near as northeastern Massachusetts. The Maine Forest Service and the Maine Department of Agriculture continue to closely monitor the status of this pest and maintain a joint quarantine regulating the importation of hemlock products from infested areas (**Quarantines** p. 59). To help prevent the introduction of the hemlock woolly adelgid, hemlock nursery stock should not be brought to Maine from infested areas. Ornamental plantings in Maine which include hemlock should be checked to see if the adelgid is present. Any woolly insects on twigs or foliage should be suspect. Suspected infestations should be reported immediately to either the State Horticulturist (Me. Dept. of Agr., 28 State House Station, Phone (207) 287-3891) or MFS, I&DM (Phone (207) 287-2431). Cooperation is needed to protect our hemlock resource.

Introduced Pine Sawfly (***Diprion similis***) - Although it was not difficult to find the solitary, marbled, green and yellow larvae of this species on white pine across the state in 1995, populations seemed to have subsided to endemic levels even in those areas infested in 1994.

Jack Pine Resin Midge (***Cecidomyia resinicola***) - Larvae of what appeared to be this species were observed in mid May 1995 on plantation jack pine in central Somerset County. The bright orange larvae could easily be seen clustered in small pitch globs along last year's shoots. Some of these shoots exhibited minor tip mortality. The frail, smoky-black, mosquito-like, midges were active by the end of May. This is the first time that we have observed high level populations in Maine and will be watching to see whether or not more serious damage will occur.

Jack Pine Sawfly (***Neodiprion pratti banksianae***) - Populations of this species were a chronic problem in 1995 as they have been for the past few years. Defoliation of mature jack pine in infested coastal areas of Hancock and Washington counties from Steuben to Mt. Desert remained localized in 1995 and again ranged from light to moderate. Most of the infested trees were on rocky, poor growing sites and therefore stunted (roughly 25± feet tall). These trees frequently had other problems as well such as the **northern pitch twig moth** and **pine-pine gall rust**.

Larch Casebearer (***Coleophora laricella***) - Numbers seemed to be down from expected levels in 1995 on native larch in many areas but higher than expected numbers have been observed on plantation Japanese larch.

Larch Sawfly (***Pristiphora erichsonii***) - Clusters of larch sawfly larvae stripped branches and occasionally whole trees with increasing frequency this past season over much of northern and eastern Maine and locally elsewhere. This rise was surprising in view of the low and scattered numbers experienced over the past twenty years. Damage this season, although heavy locally, should not cause any mortality. Growers who experienced damage this season, however, should monitor closely in June of 1996 to allow for early detection and assessment.

Mites - (See **pine fascicle** and **spruce spider mites**)

Northern Pitch Twig Moth (***Petrova = Retinia albicapitana***) - "Gobs" of pitch containing larvae or pupae of this species were still very common and unsightly on twigs and branches of jack pine especially in Hancock

and Washington counties. Most of these pitch masses were at the base of small branches or around buds. Damage by this insect is usually limited to minor twig and branch mortality and the unsightly pitch masses. This species has a two year life cycle.

Pales Weevil (*Hylobius pales*) - No reports of damage from pales weevil were received in 1995.

Pine Bark Adelgid (*Pineus strobi*) - Light to moderate infestations of eastern white pine were seen in 1995 in urban areas. This continues to be a problem on some sites especially following stress.

Pine False Webworm (*Acantholyda erythrocephala*) - This introduced species which has been very destructive to white and red pines over thousands of acres in upstate New York has not yet appeared in Maine. Hopefully it will not.

Pine Fascicle Mite (*Trisetacus alborum*) - Damage to white pine from this species remained low again in 1995.

Pine Gall Weevil (*Podapion gallicola*) - This insect continues to show up wherever red pine is found but is seldom more than a nuisance. Occasionally, however, branches of some trees may have sufficient numbers of galls to cause heavy flagging (dead branch tips).

Pine Leaf Adelgid (*Pineus pinifoliae*) - The leafy shoot-tip galls of this species appeared on schedule in 1995 on red and black spruce. Although galls were very visible in many areas, especially as they turned yellow following adelgid emergence, activity was expected to remain relatively low. Such was not the case, however, and by September understory white pine adjacent to galled spruce was often very wilted and off-color. Drought probably played a role although overwintering adelgids were very numerous on the twigs of symptomatic trees by October. Damage was spotty, local and heaviest across southern and central Maine from Kennebec County eastward.

Pine Needleminer (*Exoteleia pinifoliella*) - This species is primarily a pest of jack and pitch pine in Maine. Populations remained generally low in 1995.

Pine Needle Scale (*Chionaspis pinifoliae*) - This species is a perennial pest on a wide variety of conifers. Populations always seem heaviest on Scots and mugo pine in Maine and thus the problem is more oriented to urban and occasionally plantation situations. Few problems with this pest were brought to our attention in 1995.

Pine Spittlebug (*Aphrophora parallela*) - Spittle masses containing the pale yellow and black nymphs of this species were abundant on a variety of conifers in southern Maine by June, 1995. Populations were up overall and locally heavy on eastern white pine. Damage was minimal.

Pitch Mass Borer (*Scynanthedon pini*) - Activities of this species appeared to be down in 1995.

Redheaded Pine Sawfly (*Neodiprion lecontei*) - Larvae of this species appeared to be fairly abundant this season on mugo and young red pine in ornamental and nursery situations.

Red Spruce (Gall) Adelgid (*Pineus floccus*) - This adelgid forms its gall on red spruce predominantly in even years unlike its relative the **pine leaf adelgid**. No reports of infestations were received in 1995 but galls are expected to generate interest in 1996.

Saratoga Spittlebug (*Aphrophora saratogensis*) - No new infested areas were reported in 1995. Very limited areas are impacted by this pest in Maine and the largest of these was destroyed mechanically as damage was severe.

Spruce Beetle (*Dendroctonus rufipennis*) - Spruce beetle populations on coastal islands off Waldo, Hancock, and Washington counties showed considerable resurgence and expansion in 1994 and 1995. Small pockets of spruce beetle infestation were first reported on coastal islands in eastern Maine in 1989 about the same time that the insect was killing large numbers of white and some red spruce in northern and western Maine. Beetle populations did not reach outbreak levels on the affected islands from these first attacks and only a few large white spruce were killed. New attacks were rare by 1990. In 1991, however, an early season, wet snow storm followed by high winds resulted in blowdown on several islands. Wind thrown trees that were weakened but still alive provided an excellent breeding ground for resident spruce beetles. Large numbers of beetles from weakened trees attacked the largest white spruce near blowdown areas and pockets of mortality expanded rapidly. By late fall of 1994 many islands in Penobscot Bay and along the coast of Hancock County had a significant amount of white spruce mortality.

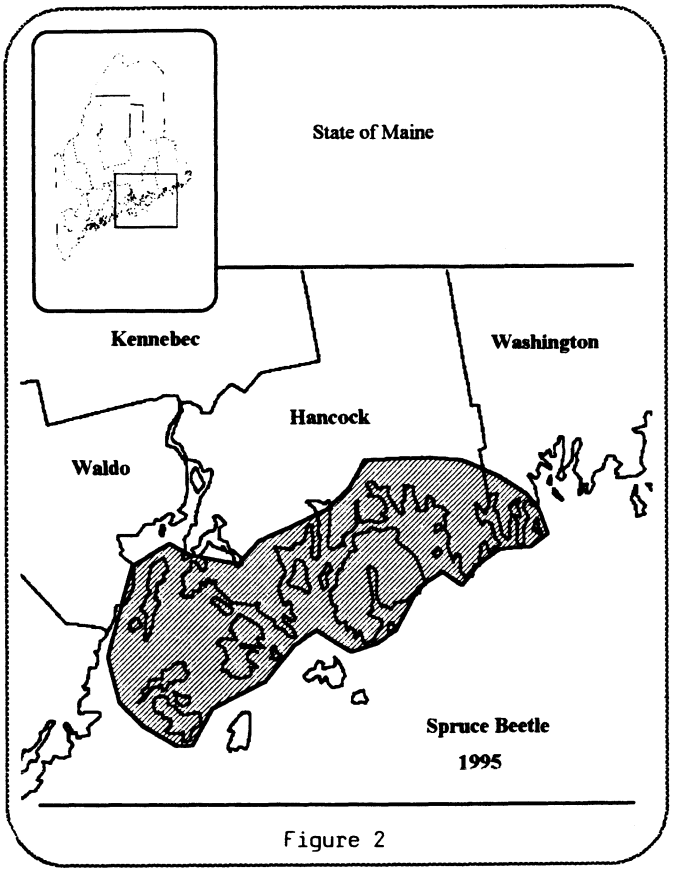

Figure 2

Areas of spruce beetle attack on the islands continued to expand and intensify in 1995. Currently several islands in eastern Penobscot Bay and islands off Deer Isle and Stonington have more than 50 percent mortality to white spruce over 10 inches DBH. Some islands may have more than 90 percent of the large (>10") white spruce either dead or heavily attacked. Heavy attack by this beetle is always fatal to the tree. As of December 1995, 1,575 acres of 30 to 50 percent mortality and 220 acres of greater than 50 percent mortality have been mapped (Fig. 2).

Compared to the spruce beetle outbreak in northern Maine in the 80's, spruce beetle on coastal islands tend to attack smaller trees. In northern Maine, spruce beetle infestation pockets subsided after most trees over 15 inch DBH had been killed and trees under 12 inches were rarely attacked. On coastal islands attack on 10 inch trees is common and several 8 inch trees have been killed. The island outbreak is similar to the northern outbreak in that the largest white spruce are the first to be attacked. Most islands that are heavily attacked were once cleared as pasture and are now forested predominantly with white spruce that is generally 80 to 120 years of age. Red spruce was the original cover species of many islands but red spruce is now rare on most infested islands. Spruce beetle attack on any residual red spruce is very rare. Many islands off Washington County are still predominantly red spruce and are not affected by the current beetle outbreak.

Island spruces killed by spruce beetle decay soon after death and most are not suitable for salvage even after one year. The island environment is very moist and bark is usually retained on dead trees for several years. These factors provide excellent conditions for decay. In northern Maine, beetle killed trees lost their bark quickly, trees dried, and decay progressed slowly increasing opportunities for salvage. Salvage opportunity on Maine's coastal islands will be limited by rapid decay, logging and transportation difficulties. Aerial and ground evaluation of coastal islands is difficult due to weather conditions and access to the islands.

Surveys for spruce beetle in mainland areas was intensified late in 1995. Several mainland and headland spruce areas in Hancock County have now been surveyed and numerous small clusters and a few larger pockets of infested white spruce have been located. To date, many of these pockets appear to be from the old infestation as a majority of the beetle killed trees died four or more years ago. However, several newly attacked trees were found along the eastern shore of Penobscot Bay. A relatively large pocket of active infestation was found in Brooksville near Cape Rosier. This area has many large white spruce that have been attacked within the last two years. Spruce beetle is still very active in the area and the infestation is likely to expand.

Spruce Budmoth (primarily *Zeiraphera canadensis*) - This problem tends to be chronic in white spruce plantations across northern and eastern Maine. Those wishing to plant and manage white spruce will have to continuously address this problem until the trees reach at least 15-20 feet and the crowns close. Little if any change in populations was noted in 1995.

Spruce Bud Scale (*Physokermes piceae*) - Clusters of these brown, lecanium-type scales were very abundant on white, Norway and occasionally black spruce in many plantations in 1995. These infestations had very likely been present for several years but had reached levels where some trees exhibited yellowing or dying tips and moderate to heavy associated sooty mold. High populations were noted particularly in Hancock, Kennebec and Washington counties and were often associated with high populations of the eastern spruce gall adelgid.

Spruce Budworm (*Choristoneura fumiferana*) - Spruce budworm populations, as measured by a variety of surveys, remained very low in 1995. Very few budworm larvae were found in forest insect survey collections and no defoliation due to budworm was recorded. The number of moths collected in both light and pheromone traps also remained low and an increased budworm population level is not expected in 1996.

Spruce budworm moth activity was monitored using the statewide network of 24 light traps (Fig. 1). The trend of very low budworm moth catches continued in 1995. Only 24 moths were caught in 1995, a per trap average of 1.0 (Table 5). Budworm moth catch has been below 5 moths per trap since 1990 compared to catches per trap that exceeded 5,000 in many years during the 70's and 80's (Table 6). Budworm moths were caught in 11 of the 24 traps operated during 1995 compared to 5 locations in 1994 and 11 in 1993 (Table 5).

Table 5. Total number of spruce budworm (*Choristoneura fumiferana*) moths collected at light

	Year					
Location	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**
Allagash	3	0	1	7	0	2
Arundel					0	3
Ashland	0	0	0	0	0	0
Blue Hill	1	0	0	4	0	0
Brunswick	0	3	0	0	0	1
Calais	11	3	0	0	0	0
Chesuncook	0	1	0	1	0	0
Clayton Lake	4					
Dennistown	0	0	0	0	0	1
Elliotsville	0	0	0	2	0	1
Exeter	10	4	5	21	16	6
Greenbush	0	1	0	1	0	0
Guerette	0	0	0	0	0	0
Haynesville	1	0	0	0	2	0
Kingfield	0	0	0	2	2	0
Matagamon	0	0	1	2		
Millinocket	0	1	0	0	0	4
Mt. Vernon	1	0	0	2	1	2
No. Bridgton	0	0	1	0	0	2
Rangeley	1	0	2	8	0	1
Shin Pond					0	0
South Berwick	0	0	0	2	0	0
St. Aurelie	0	0	0	0	0	0
Steuben	73	8	0	0	5	0
Topsfield	0	0	0	0	0	1
Washington	2	0	6	0	0	0
Total Number of Moths	107	21	16	52	26	24
Total Number of Traps	24	23	23	23	24	24

Table 6. Spruce budworm seasonal light trap summary - 1961-1995

Year	Total # Moths	# Traps	Average # Moths/Trap
1961	763	17	44.9
1962	258	23	11.2
1963	133	24	5.5
1964	159	25	6
1965	83	24	3.5
1966	51	24	2
1967	120	26	4.6
1968	948	24	39.5
1969	5,415	27	201
1970	1,076	24	45
1971	20,653	25	826
1972	15,959	24	665
1973	39,069	24	1,628
1974	158,784	24	6,616
1975	149,874	23	6,516
1976	22,308	16	1,394
1977	24,212	15	1,614
1978	220,264	17	12,957
1979	95,811	16	5,988
1980	100,537	19	5,291
1981	39,724	20	1,986
1982	49,200	20	2,460
1983	144,673	18	8,037
1984	17,983	20	895
1985	13,233	20	661
1986	1,365	20	68
1987	464	20	23.2
1988	29	17	1.7
1989	731	22	33.2
1990	107	24	4.5
1991	21	23	0.9
1992	16	23	0.7
1993	52	23	2.3
1994	26	24	1.1
1995	24	24	1.0

Pheromone traps were also used in 1995 to measure budworm moth activity. As in 1994, 11 of the pheromone locations were placed close to light traps in the spruce/fir regions of Maine. As with the light traps, moth catch in pheromone traps was very low in 1995. The highest per trap catch was 4 in the town of Franklin and only 7 of 27 locations had 1 or more moth per trap (Table 7). No budworm moths were caught at 17 of the 27 locations trapped in 1995 compared to 12 of 24 locations in 1994.

Table 7. Spruce Budworm Pheromone Trap Catch in Maine - 1992 to 1995*

Location	*Year*				*Location*	*Year*			
	1992	*1993*	*1994*	*1995*		*1992*	*1993*	*1994*	*1995*
Allagash		5	<1	<1	Jonesboro	11	1	<1	<1
Calais **	<1	<1	<1	<1	NE Carry		<1		<1
Chesuncook	6	2	<1	<1	Princeton		2		<1
Clayton Lake		2	<1	<1	Steuben **	32	4	2	2
Coburn Gore		1	<1	1	St. Pamphile		7	1	1
Connor		<1	<1	<1	Topsfield **	1	<1	<1	<1
Daaquam		<1	<1	<1	Waltham	25	2	4	<1
Dennistown **	5	1	<1	1	Smith Pond **	6	3	<1	<1
Dickey Brook **	<1	3	<1	<1	St Frances Lake		1	<1	2
Duck Lake	<1	<1	<1	<1	Oxbow	10	<1	<1	<1
Franklin			37	4	Ragmuff		1		
Garfield	6	2	<1	<1	Rangeley		1	2	<1
Greenbush **	3	<1	<1	<1	Ste. Aurelie **	2	<1	<1	1
Haynesville **	4	1	<1	<1	Matagamon ***	18	4	1	1

* These figures reflect a per trap average from a cluster of three traps ** Light trap locations *** A light trap this location only in 1992 and 1993

Spruce Spider Mite (*Oligonychus ununguis*) - Mites are one of the perennial problems with great variability in local and seasonal populations. They do, however, appear to be more of a serious problem on ornamentals and Christmas trees. Weather conditions were again very favorable for the development of spruce spider mites in many parts of Maine in 1995. Populations reached damaging levels on balsam and Fraser fir, especially in portions of central Maine and mottling of the foliage was locally very heavy.

White Pine Weevil (*Pissodes strobi*) - The white pine weevil is one of those chronic problems in most areas of Maine and seriously limits growth of good straight white pine unless controlled. Young trees normally bear the highest incidence of attack. Occasionally older trees come under increasing attack for one reason or another thus creating a noticeable increase in symptomatic trees such as was experienced in 1995. In several cases, young pines under five feet in height were weeviled so extensively as to be killed. Colorado blue and Norway spruce were also heavily weeviled in 1995 in some situations.

Yellowheaded Spruce Sawfly (*Pikonema alaskensis*) - Populations continued to run high on open-grown spruce across much of Maine in 1995. Some mortality became evident especially on roadside trees which had been defoliated in several successive seasons. The biggest change noted in 1995 was the increase in reports of defoliation in forest plantations and regeneration by the species, especially in northern Franklin County where approximately 250 acres of spruce exhibited noticeable signs of feeding.

(B) Hardwood Insect Pests

NOTE: This section now includes all insect pests of deciduous trees and shrubs in forest, ornamental and urban settings

Alder Insects (various) - Although alder thickets generally remain a concern primarily to hunters as a woodcock cover, when they turn brown, as they did in 1995, we receive numerous calls of concern. Most of the browning across central and southern Maine appeared to be due to feeding by the blue-black larvae and shiny adults of the **alder flea beetle** (*Altica ambiens alni*). In some areas especially in Kennebec County, however, it was the paler larvae and spotted yellowish adults of the **alder leaf beetle** (*Chrysomela mainensis mainensis*) which were the culprits. Where populations of these two species were lighter so that some green foliage remained, larvae of the whitish **alder woolly sawfly** (*Eriocampa ovata*) and a yellow and spotted, orange-headed **alder sawfly** (*Arge* sp.) seemed more abundant than usual. To add to the problem even the **spotted tussock** (*Lophocampa maculata*) got into the act. Populations of the **alder woolly aphid** (*Prociphilus tessellatus*) were also up in many thickets.

Aphids (various) - Aphid populations seem to be doing very well overall. High local populations have been reported to us from birch, maple, mock orange (*Philadelphus*), roses, and willow. The attractive slate-blue **black willow aphid** (*Pterocomma smithiae*) with its yellow/orange cornicles, coated stems of black willow along wet runs in Kennebec County. Some feeding stress was observed on hosts in association with high numbers of aphids.

Ash Defoliators (various) - White ash over much of southern and central Maine looked very thin this past season from a variety of causes. **Ash leaf and twig rust** defoliated ash in coastal stands while **ash anthracnose** thinned foliage on inland sites. Associated with these diseases was a "parade" of insect problems as well. While we received a number of "after the fact" reports, we were able to implicate one or more sawflies, a **pyralid moth larva** (*Palpita magniferalis*), **fall webworm** (*Hyphantria cunea*), the **great ash sphinx** (*Sphinx chersis*) and the larvae of the **promethea moth** (*Callosamia promethea*). Damage from the first three appeared most extensive. We also received one report of a **woolly aphid**, possibly *Prociphilus americanus*, on ash foliage in Augusta. This species occurs fairly commonly on the roots of balsam fir.

Ash Flowergall Mite (*Aceria fraxiniflora*) - Populations of this pest seemed to remain fairly stable in 1995. Although damage remained noticeable on infested trees, there seemed to be little expansion of activities.

Ash Plant Bug (*Tropidosteptes amoenus*) - Feeding by nymphs of what appeared to be this species caused distortion and yellowing of developing ash foliage on a shade tree in Waterville in early June. This degree of damage has been rare in Maine so far.

Aspen Leafroller (*Pseudexentera oregonana*) - Populations continued to diminish somewhat in intensity in 1995 although the infested area remained analogous to that of 1994. Most defoliation was in the light category with only small pockets or individual trees showing heavier defoliation (Table 8).

Table 8. Aspen leafroller (*Pseudexentera oregonana*) defoliation - 1995

County	Acres	Comments
Aroostook	50,000	Central & Southern - light defoliation
Penobscot	1,000	Northern & Southern - spotty defoliation
Piscataquis	20,000	Central & Southern - light defoliation
Total	**71,000**	

Balsam Poplar Leafminer (*Lyonetia* sp.) - Populations of this species again remained very low in 1995 in infested areas of Aroostook County. The reddening effect of mined foliage was not evident from either the air or the ground as it has been in previous seasons.

Bark Lice or Psocids - "Herds" of these interesting "little cattle" became very noticeable on the bark of various trees this past season especially in southern Penobscot County. Although colonies are usually more abundant and evident on hardwoods, they also occur on a variety of softwoods as well. The species most commonly noticed was again *Cerastipsocus venosus*. At first they appeared as patches of tiny tan specks on the bark in early July. As they approached maturity in late July they appeared as small (3/16" long), gray insects with white cross banding. The adults have dark smoky-gray wings with a triangular light spot on each forewing. Bark lice feed on lichens and fungi on the tree bark and not on the tree itself so they do no harm. They disappeared soon after the adults developed wings in August. Eggs were laid beneath silk patches on the bark. These will hatch in June of 1996.

Beech Blight Aphid (*Fagiphagus imbricator*) - This interesting woolly aphid was reported from a number of southern Maine locations in 1995. Although not terribly abundant it was another unusual sucking insect which made a rather rare appearance in Maine in 1995.

Beech Scale (*Cryptococcus fagisuga*) - Beech in Maine suffers from a variety of problems but the beech bark disease complex is still the most serious. **Beech bark disease**, an introduced problem, involves an insect/fungus complex (*C. fagisuga/Nectria* spp.) which stresses, deforms and kills beech. It occurs statewide but varies locally and annually at least in intensity of expression. Although *C. fagisuga* appears to be the most common scale involved, the **birch margarodid** (*Xylococculus betulae*) is also an important component of the complex. In recent years another scale, the **oystershell scale** (*Lepidosaphes ulmi*), has added another factor to this complex. Fortunately some relief comes from the feeding activities of the **twice-stabbed lady beetle** (*Chilocorus stigma*) whose hunger for scales helps to significantly reduce scale populations.

The impact of all of this activity on our beech resource is made more pronounced when complicated by **drought** and defoliation by such things as the **variable oakleaf caterpillar** such as experienced in 1995. Some stands were already under severe stress prior to 1995 and will likely suffer increased losses in 1996.

Birch Casebearer (*Coleophora serratella*) - Birch casebearer defoliation was very heavy on roadside and understory white and gray birch throughout much of the state in 1995. The heaviest defoliation occurred in southern Franklin County and in Aroostook, Kennebec, Piscataquis and Somerset counties. As many as twelve to fourteen cases could be found on the remnants of a single leaf. Acreage figures were difficult to assign due to the nature of the infestation and the fact that casebearer infestations were often contiguous with those of the leafminer (*Messa*). However we estimate that roughly 18,000 acres exhibited moderate to severe defoliation (Table 9). Birch decline plots set up in the 1980's continue to be monitored. Damage in these plots is due in part to birch casebearer as well as bronze birch borer and other factors.

Table 9. Birch casebearer (*Coleophora serratella*) defoliation - 1995

County	Acres	Comments
Aroostook	10,000	Roadside and understory defoliation locally severe
Franklin	1,000	Spotty severe roadside defoliation. Plot survey
Kennebec	1,000	Spotty severe roadside defoliation
Piscataquis	3,000	Severe roadside defoliation
Somerset	3,000	Severe roadside defoliation
Total	**18,000**	

Birch Insects (various) - Birch is a favorite host for a great variety of insects, many of which are more of a curiosity than pests. To bring the range of insects encountered in 1995 into better focus we present the following sequential summary.

Browning of understory and roadside birch from mining activity of the **birch casebearer** (*Coleophora serratella*) in May and June was followed in southern Maine by **birch leaf miner** (*Messa nana*) feeding. In north central Maine defoliation by the larvae of the **birch sawfly** (*Arge pectoralis*), **dusky birch**

sawfly (*Croesus latitarsus*) and the **striped alder sawfly** (*Hemichroa crocea*) added another dimension in July aided by the **fall webworm** (*Hyphantria cunea*). Later in the season defoliation in southern Maine by the **orangehumped mapleworm** (*Symmerista leucitys*), **redhumped oakworm** (*Symmerista albifrons/ canicosta*) and **variable oakleaf caterpillar** (*Lochmaeus manteo*) was often accompanied by that of the **pale tussock** (*Halysidota tessellaris*) and the **spotted tussock** (*Lophocampa maculata*).

The **birch lacebug** (*Corythucha pallipes*) caused noticeable mottling of yellow and white birch in August in many areas in 1995. This mottling and messy habit of littering the underside of leaves with excrement and shed nymphal skins can become an aesthetic problem.

Of more interest to the casual observer are the larger caterpillars such as those of the abundant **tiger swallowtail** (*Papilio glaucus/canadensis*), **mourning cloak** (*Nymphalis antiopa*), **luna moth** (*Actias luna*) and **polyphemus moth** (*Antheraea polyphemus*). A number of **hornworms** (Sphinx moth larvae) also occur on birch. Most of these larger (often reaching 3" or more in length) caterpillars are solitary and do no significant damage so should be left alone.

The so-called "catkin bugs" were again in abundance in 1995. These can become a serious nuisance especially in the fall around homes. More notable among these are the **birch catkin bug** (*Kleidocerys resedae*), **catkin weevil** (*Apion simile*) and the **mottled stink bug** (*Elasmucha lateralis*). All of these may also feed on foliage as well but damage is usually minimal except to seed. The stink bug has the unique maternal habit of standing protectively over eggs and young.

All of these insects stress trees especially when accompanied by drought. Recent transplants or trees on droughty sites are especially affected. Trees thus stressed are subject to attack by the opportunistic **bronze birch borer** (*Agrilus anxius*).

Birch Leafminer (***Messa nana***) - This birch leafminer seemed to expand its activities in 1995 over much of the state. Although the area of noticeable damage was much the same as in 1994 some increase in intensity was observed (Fig. 3). Hot spots occurred throughout the infested area but the heaviest populations occurred along the coast east of Portland. Approximately 4,530 acres of moderate to severe defoliation were reported within the generally infested area (Table 10).

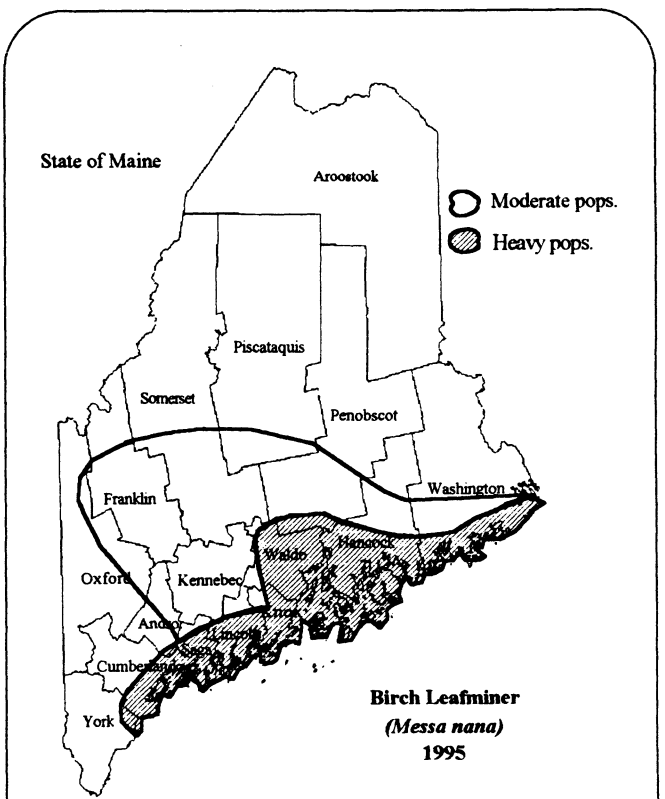

Figure 3

Table 10. Birch leafminer (*Messa nana*) defoliation 1995

County	Acres
Hancock	500
Knox	1,000
Lincoln	1,000
Oxford	30
Waldo	1,000
Washington	1,000
Total	**4,530**

Birch Skeletonizer (*Bucculatrix canadensisella*) - Although larvae of this species could be found on birch in most areas of the state in 1995, heavy populations were very scattered and lighter overall than in 1994.

Bronze Birch Borer (*Agrilus anxius*) - Dead-topped birch resulting from stem mining activities of this borer seem to be increasingly evident nearly everywhere and the increased host stress from this past season may accelerate the problem over the next couple of years. It certainly bears watching.

Browntail Moth (*Euproctis chrysorrhoea*) - The browntail moth was very abundant on Casco Bay islands in 1995. It has also become re-established in scattered locations from Kittery to Rockland especially around Casco Bay (Fig. 4). An aerial assessment delineated 2,420 acres of hardwood trees and shrubs partially to completely defoliated in July, 1995. Favored larval hosts of the browntail include: oaks, apple, shadbush and rugosa rose, however, a broad range of deciduous tree or shrub species may be fed upon. Even more significant than the defoliation, in many cases, are the problems associated with hairs from the larvae and to a lesser extent from the moths of the browntail. These hairs are toxic and may cause an intense skin rash if they come into contact with the skin or respiratory distress if inhaled.

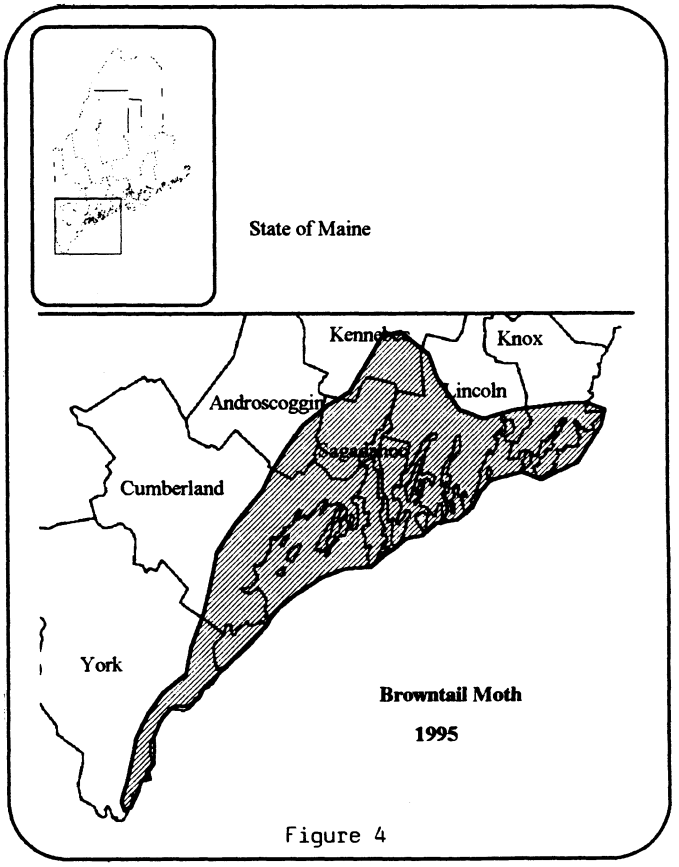

Figure 4

Numerous reports were received of people seeking medical attention as a result of contact with these hairs and a few of the most severe cases required hospitalization (see **rashes** p. 40).

The city of Portland completed an aerial suppression project in 1995 involving approximately 250 acres of forested land on Great and Little Diamond islands using Dimilin applied with flat fan nozzles. The Maine Forest Service monitored the application and collected data to assess the product efficacy. The project was considered a great success by islanders and mortality of browntail larvae was measured at 100% in treated areas as compared to 4.9% in untreated areas. Future work will be done to assess the potential for lower application rates which would be less environmentally threatening.

While the range of the browntail moth infestation expanded in 1995, very few of the newly infested stands exhibited high population levels. The current (1995-96) winter survey still indicates that only very limited mainland acreage has sufficient numbers of insects to require control in 1996. The browntail infestation is much more intense on several large islands which have been infested for several years; notably Peaks, Cushing, Long and Great Chebeague. The browntail has continued to expand in Casco Bay to the north and east as populations intensify on Cliff, Bustins and the Moshiers islands.

Residents living within infested areas may get relief from this pest by clipping and destroying overwintering webs on low shrubs prior to larval emergence which will occur mid to late April. If webs are located in mature oaks, the height is a deterrent to manual control and chemical control may be the best option. Chemical control usually requires more equipment than the homeowner can feasibly obtain and is often best left to a professional. A listing of licensed pesticide applicators who provide browntail moth control services is available from this office. If a very restricted area is involved, the homeowner may be able to treat shrubs with a compressed air sprayer or individual large trees with systemic capsules. More details on pesticides and control techniques are available in our browntail moth control sheet.

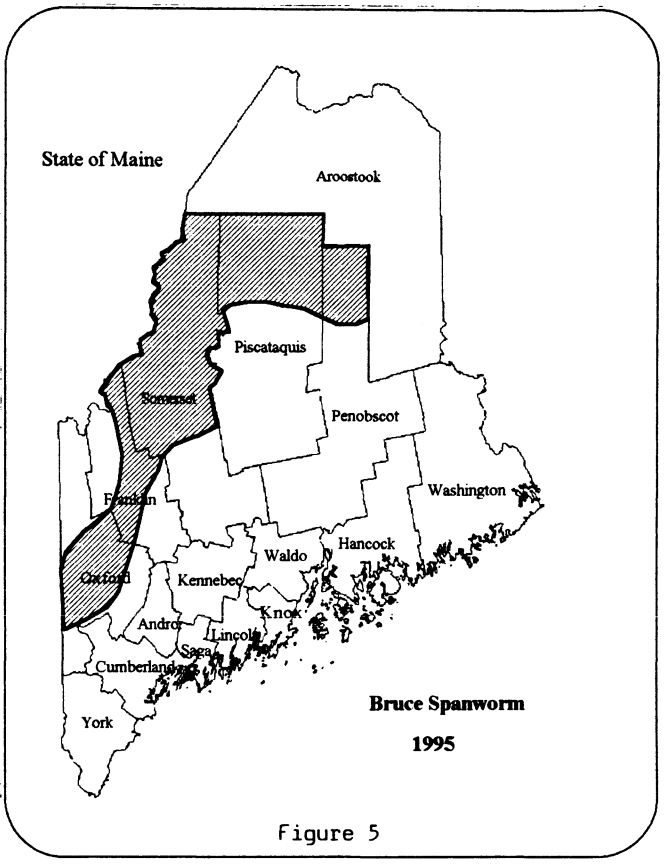

Figure 5

Bruce Spanworm (***Operophtera bruceata***) - Populations of the Bruce spanworm were relatively stable in 1995. Defoliation of understory beech and, to a lesser extent, sugar maple and trembling aspen seemed lighter in areas infested in 1994 but higher in a few newly detected stands especially in Oxford and Franklin counties (Fig. 5). A total of 10,000 acres were reported (Table 11) of which only 500 could be detected aerially.

Table 11. Bruce spanworm (*Operophtera bruceata*) defoliation - 1995

County	Acres
Franklin	500
Oxford	500
Penobscot	2,500
Piscataquis	1,500
Somerset	5,000
Total	**10,000**

Butterflies (various) - There were a number of butterfly "population explosions" which took place in 1995 which drew a good share of attention and are worthy of note here. Early in June the landscape across central and northern Maine was "sprinkled" with yellow as **tiger swallowtail** butterflies (*Papilio glaucus/canadensis*) took flight. Scattered individuals appeared nearly everywhere but in central and northern sections of the

state large aggregations were reported especially around puddles along wood roads. Populations of this magnitude have not been seen for many years and unfortunately many ended up adorning car radiators and grills. Although the larvae of this species feed on a variety of trees, especially aspen, birch and willow, surprisingly we received no reports of larval activity during the season! Other species reported in numbers were the **mourning cloak butterfly (spiny elm caterpillar)** statewide and the **European (grass) skipper** (*Thymelicus lineola*) in northeastern Aroostook County. The European grass skipper is an introduced pest, the larvae of which feed on timothy grass. Literally clouds of this skipper caused some concern as they flew about in both urban and farmland areas of eastern Aroostook County in early July.

Butternut Woollyworm (*Eriocampa juglandis*) - These very fascinating sawfly larvae again drew attention during July. Although they can be very abundant on individual trees, causing noticeable defoliation, they are usually simply a curiosity. The larvae are covered with a white waxy "wool" which often occurs in long strands or curls. They are related to the alder woolly sawfly. A small stand of butternut north of Guilford village was completely defoliated in July by this species and numbers of larvae were common on individual trees elsewhere.

Cherry Uglynest Caterpillar (*Archips cerasivorana*) - This species, often called simply the **uglynest caterpillar**, appears to hit primarily low cherry bushes along roadsides or in old fields. The tight webs containing numerous yellowish larvae with black heads were common in 1995 especially in eastern Maine.

Cottony Maple Scale (*Pulvinaria innumerabilis*) - Reports of this scale were scattered and light in 1995.

Eastern Tent Caterpillar (*Malacosoma americanum*) - Tents of this species were more abundant in many areas of the state in 1995 than in 1994. Some of the most noticeable population increases were in central Maine. Defoliation of cherry and apple especially in brushy or roadside situations was heavy. This is our only early season (May) tentmaker and we often see larvae of the gypsy moth and forest tent caterpillar (a non-tentmaker) "cuddled up" with those of the eastern tent caterpillar within a single tent! New tents in similar situations from mid-June through July are probably those of the **cherry uglynest caterpillar** or **fall webworm**. In coastal areas watch carefully for the communal webs of the **browntail moth** caterpillars.

Elm Flea Beetle (*Altica carinata*) - Lower branches and small trees of many of those remaining American elms again "browned up" in July across central and southern Maine from feeding by the blue-black larvae of this species. Most larvae had dropped to the soil to pupate by early August. As expected, the metallic blue, purple or green adults appeared in September about the same time as the slightly larger **alder flea beetle** adults. Populations of the **elm leaf beetle** (*Pyrrhalta luteola*) appeared to be low in 1995 as they have been for several years. Several isolated reports of defoliation by the **spiny elm caterpillar** were also received in 1995.

Fall Cankerworm (*Alsophila pometaria*) - Defoliation of boxelder in eastern Aroostook County was again very noticeable in June (Fig. 6). Populations remained fairly stable at the high 1994 levels.

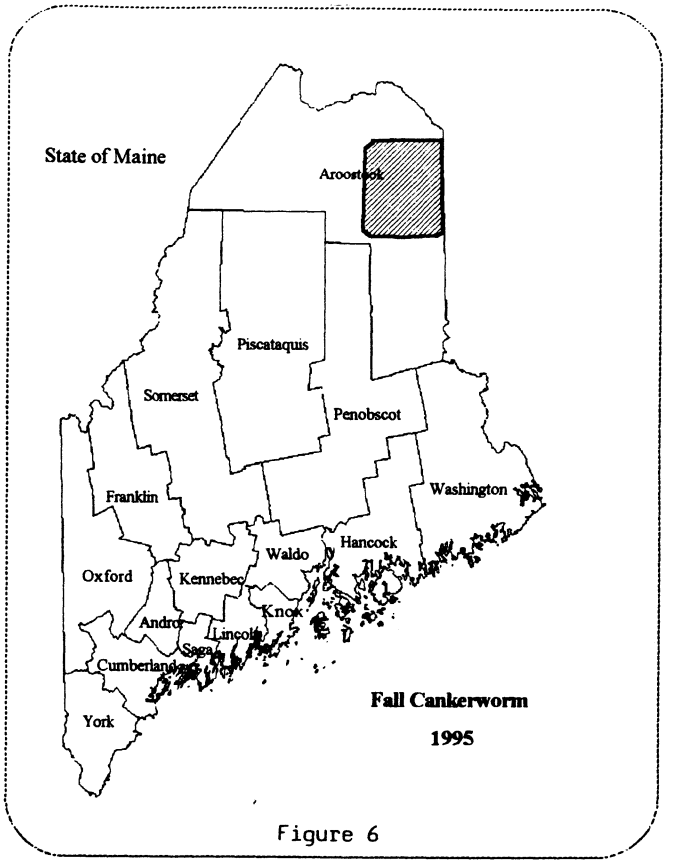

Figure 6

Fall Webworm (*Hyphantria cunea*) - Those relatively loose tents containing larvae of this species were again very common on a wide variety of deciduous hosts in July and August especially in northern Maine. They seemed most common on alder, apple, ash, beech, birch, cherry, elm and oak.

Forest Tent Caterpillar (*Malacosoma disstria*) - Populations of the forest tent caterpillar appeared to be higher in 1995 than in 1994, continuing the slow but steady upward trend observed since 1990. Large scale areas of moderate to severe defoliation were not recorded in Maine in 1995 but significant larval numbers were found in many areas and heavy defoliation was seen on small groups of trees and in a few pockets of up to 5 acres (Table 12). Several pockets of one half acre to 3 acres were reported in eastern Aroostook County from Mars Hill to Caribou and 5 acres of heavy defoliation on red oak and aspen was recorded on Hardy Island in Boothbay. Reports of forest tent caterpillar were most common in southern Kennebec County (especially Augusta-Waterville), southern Penobscot County (especially around Bangor), eastern Aroostook, and in York County. In the Bangor area, the forest tent caterpillar caused noticeable defoliation on black locust! As in past years, forest tent caterpillar was often found in areas that also had significant populations of gypsy moth and eastern tent caterpillar and the caterpillars of all these could sometimes be found together.

The number of moths caught in our light trap survey has remained relatively stable for the past three years (Table 13) at higher than normal levels. It is possible that populations could undergo a resurgence in 1996. The situation bears watching.

Table 12. Forest tent caterpillar (*Malacosoma disstria*) defoliation - 1995

County	Acres	Comments
Aroostook	50	Scattered pockets
Lincoln	5	Hardy Island
Penobscot	3	Bangor area
Kennebec & York	40	Scattered pockets
Total	**98**	

Table 13. Total number of forest tent caterpillar (*Malacosoma disstria)* moths collected at light

	Year					
Location	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**
Allagash	65	39	54	78	64	27
Arundel					82	150
Ashland	110	122	124	169	117	157
Blue Hill	20	27	43	47	221	62
Brunswick	54	69	17	9	35	32
Calais	7	11	23	279	52	28
Chesuncook	0	0	1	0	2	1
Clayton Lake	7					
Dennistown	45	37	58	44	89	79
Elliotsville	36	49	78	55	53	145
Exeter	1	1	2	1	8	4
Greenbush	44	56	24	30	87	95
Guerette	20	28	8	12	32	18
Haynesville	45	56	36	45	176	64
Kingfield	1	4	18	20	97	95
Matagamon	46	63	126	56		
Millinocket	14	20	43	7	73	75
Mt. Vernon	39	32	107	39	187	192
No. Bridgton	90	115	153	297	223	102
Rangeley	1	81	47	48	57	11
Shin Pond					124	217
South Berwick	245	352	324	377	371	195
St. Aurelie	6	18	13	9	28	15
Steuben	8	9	0	2	169	11
Topsfield	33	28	45	102	178	40
Washington	31	23	36	53	111	41
Total Number of Moths	968	1,240	1,380	1,779	2,636	1,856
Total Number of Traps	24	23	23	23	24	24

Greenstriped Mapleworm (*Dryocampa rubicunda*) - Populations of this species rose slightly in 1995 but defoliation was light and spotty. This species is primarily a feeder on red maple in Maine. Numbers of the medium-sized, attractive, pink and yellow moths (the **rosy maple moth**) rose noticeably in 1995 for the fourth consecutive year (Table 14). Numbers increased at 15 out of 24 light trap stations.

Table14. Total number of greenstriped mapleworm (*Dryocampa rubicunda*) moths collected at light

	Year					
Location	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**
Allagash	0	0	0	2	0	0
Arundel					468	531
Ashland	0	0	0	1	0	0
Blue Hill	115	24	46	104	46	113
Brunswick	20	13	16	4	27	20
Calais	20	7	4	13	29	240
Chesuncook	10	4	1	3	8	51
Clayton Lake	0					
Dennistown	1	0	1	1	5	1
Elliotsville	58	7	11	14	30	103
Exeter	6	1	1	3	9	7
Greenbush	16	10	12	13	14	48
Guerette	0	0	0	0	0	0
Haynesville	5	8	2	8	12	34
Kingfield	0	0	0	0	0	0
Matagamon	0	0	0	0		
Millinocket	61	8	27	38	66	93
Mt. Vernon	2	24	18	5	11	32
No. Bridgton	2	4	6	2	6	24
Rangeley	0	0	0	1	0	0
Shin Pond					0	1
South Berwick	95	41	373	340	189	276
St. Aurelie	0	0	0	0	0	0
Steuben	14	42	84	22	33	56
Topsfield	17	20	12	31	37	133
Washington	7	89	48	90	101	181
Total Number of Moths	449	302	662	695	1,091	1,944
Total Number of Traps	24	23	23	23	24	24

Gypsy Moth (*Lymantria dispar*) - Populations of gypsy moth larvae and the resultant defoliation continued to decline in 1995 reaching the lowest level in the current outbreak (Table 15). No defoliation >30% was detected during aerial surveys in July. This is the fourth consecutive year of decline from the high 1991 levels. Although no significant defoliation was detected, low numbers of gypsy moth caterpillars continued to show up throughout the season in traditionally infested areas.

Table 15. Total acres defoliated by gypsy moth in Maine during the current outbreak (1988-1995)

Year	Acres Defoliated
1988	100
1989	34,280
1990	270,432
1991	620,933
1992	278,485
1993	50,694
1994	1,706
1995	0

Gypsy moth egg hatch was two to three weeks behind previous years but could be monitored only in a few areas due to low population levels. The first hatch observed was from the Augusta area on May 15 followed much later by Millinocket on May 30!

Moth activity was again monitored using light traps and pheromone traps. Moth activity confirmed low larval activity and was generally down in 1995 (Table 16). Light trap collections dropped from 44 moths in 1994 to 36 in 1995. Both surveys will be conducted again in 1996.

Egg mass surveys conducted during September 1995 revealed very few, if any, egg masses indicating the likelihood of very low populations statewide in 1996. Some very local exceptions could occur and IDM staff will continue to monitor populations.

The **Asian gypsy moth** has not yet been found in Maine. Because it has been detected on the east coast, possibly as close as Connecticut, we continue to work with the USDA-APHIS-PPQ to closely monitor Maine populations especially around ports of entry.

Table 16. Total male gypsy moths *(Lymantria dispar)* collected at light

	Year					
Location	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**
Allagash	0	0	0	0	0	0
Arundel					0	1
Ashland	0	0	0	0	0	0
Blue Hill	0	0	0	1	4	0
Brunswick	20	220	6	0	0	0
Calais	0	2	5	0	0	0
Chesuncook	0	0	0	0	0	0
Clayton Lake	0					
Dennistown	0	0	0	0	0	0
Elliotsville	0	0	0	0	0	0
Exeter	0	3	0	0	0	0
Greenbush	0	0	29	0	0	0
Guerette	0	0	0	0	0	0
Haynesville	0	0	0	0	0	0
Kingfield	0	0	0	0	0	0
Matagamon	0	0	0	0		
Millinocket	0	4	0	1	7	0
Mt. Vernon	15	142	78	1	27	12
No. Bridgton	156	213	17	1	2	0
Rangeley	1	0	0	0	0	0
Shin Pond					0	0
South Berwick	29	191	315	153	4	23
St. Aurelie	0	0	0	0	0	0
Steuben	0	1	3	0	0	0
Topsfield	0	2	1	2	0	0
Washington	0	13	19	0	0	0
Total Number of Moths	221	791	473	159	44	36
Total Number of Traps	24	23	23	23	24	24

Hardwood Defoliators - A variety of interesting hardwood defoliators are observed and collected each season in the course of our field work. Table 17 highlights those which were common enough in 1995 to mention but which may or may not be discussed elsewhere in this report.

Table 17. Miscellaneous defoliators collected from hardwoods in 1995*

American Dagger Moth, *Acronicta americana*	Laurel Sphinx, *Sphinx kalmiae* (A)
Big Poplar Sphinx, *Pachysphinx modesta* (P)	Luna Moth, *Actias luna* (Bi)
Birch Sawfly, *Dimorphopteryx* sp. (Bi)	Pale Tussock, *Halysidota tessellaris* - **hairs can cause rash**
Dagger Moth, *Acronicta* spp.	Polyphemus Moth, *Antheraea polyphemus* (Bi)
Elm Sawfly, *Cimbex americana* (Bi)	Spiny Oak-Slug Moth, *Euclea delphinii* - **spines can cause rash**
Flat Leaftiers, *Psilocorsis* spp. (Be)	Unicorn Caterpillar, *Schizura unicornis*
Great Ash Sphinx, *Sphinx chersis* (A)	Unicorn Caterpillar, *Schizura ipomoeae*
Hickory Tussock, *Lophocampa caryae* - **hairs can cause rash**	Webworms, *Tetralopha* spp.
Hornworms, several species	Yellowlined Caterpillar, *Nadata gibbosa* (Bi)
Lacecapped Caterpillar, *Oligocentria lignicolor* (Be,Bi)	Yellownecked Caterpillar, *Datana ministra*

* Collected from a variety of host trees in 1995 unless otherwise specified
A = Ash, Be = Beech, Bi = Birch, P = Poplar

Hunter's Moths (adults of several species of cankerworms) - The adults of a number of species of loopers/cankerworms fly late in the season from September through November. Over the years these have come to be known as **hunter's moths**. During the fall of 1995 most of these were active but did not seem nearly as abundant as in previous seasons. Species included in this group are: **Bruce spanworm**, **fall cankerworm** and **hemlock looper**.

Large Aspen Tortrix (*Choristoneura conflictana*) - No defoliation by large aspen tortrix was detected with either ground or aerial surveys in 1995. The number of moths collected at our light trap stations substantiated other surveys. Moth numbers remained low in 1995 (Table 18).

Table 18. Total number of large aspen tortrix (*Choristoneura conflictana*) moths collected at light

	Year					
Location	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**
Allagash	13	1	0	5	0	0
Arundel					0	12
Ashland	10	0	0	0	0	0
Blue Hill	0	3	14	2	1	5
Brunswick	0	0	3	0	0	0
Calais	6	14	2	0	0	0
Chesuncook	0	0	0	0	0	0
Clayton Lake	7					
Dennistown	974	0	0	2	0	1
Elliotsville	159	33	42	14	0	2
Exeter	0	5	4	15	6	12
Greenbush	2	25	28	29	0	0
Guerette	0	1	0	0	2	0
Haynesville	15	257	3	0	0	0
Kingfield	2	0	3	0	0	0
Matagamon	0	0	3	0		
Millinocket	11	14	5	0	0	3
Mt. Vernon	1	4	2	2	0	5
No. Bridgton	0	0	2	0	0	2
Rangeley	1	5	47	92	0	13
Shin Pond					1	0
South Berwick	0	3	4	0	0	0
St. Aurelie	8	0	0	1	0	0
Steuben	0	4	2	1	0	0
Topsfield	42	20	15	1	0	0
Washington	0	0	14	0	0	2
Total Number of Moths	1,251	389	193	164	10	57
Total Number of Traps	24	23	23	23	24	24

Locust Leafminer (***Odontota dorsalis***) - Black locust throughout much of southern Maine south of Lincoln and west of Machias showed varying degrees of rusty foliage, the result of leaf mining activities of this species in 1995. Some stands appeared to be spared while others were "scorched." Populations were the heaviest yet experienced.

Maple Leafroller (***Sparganothis acerivorana***) - Populations of maple leafroller remained very low again in 1995 and little defoliation or red maple was observed even in areas of Hancock and Washington counties where defoliation has been heavy in the past.

Mountain Ash Sawfly (***Pristiphora geniculata***) - This introduced species is on our list of perennial problems affecting ornamental mountain ash. The 1995 season was no exception with the usual complaints in spite of the fact that control of the problem is easy to achieve. This sawfly is seldom a problem on native mountain ash in the wild.

Oak Insects (various) - Populations of the **oak leaf shot-hole fly** (*Japanagromyza viridula*) and **oak twig pruner** (*Elaphidionoides villosus*) remained relatively low in 1995 with little damage evident to red oak overall. It was not difficult however, to find the shiny black, red-spotted **oak leafrolling weevils** (*Attelabus bipustulatus*) and their pellet-like larval leaf rolls. **Acorn weevils** (*Conotrachelus ? posticatus*) were also extremely abundant locally in 1995 especially in the Camden area. In one situation, hundreds of them caused a commotion as they collected in and around recently painted outside toilet facilities in mid-June! A heavy acorn crop in 1994 probably exacerbated the problem. The spiny, flat, green, brightly marked **spiny oak slug** was more frequently noticed on oak foliage in 1995 than it has been for a number of years. The spines can cause a **rash** and/or a mild stinging sensation if the caterpillars are handled.

Oak Leaftier (Shredder) (***Croesia semipurpurana***) **and oak leafroller** (***Archips semiferana***) - Defoliation by these two species in 1995 was again very local. Light infestations of the leaftier continued to occur in Kennebec and Lincoln counties. The **oak skeletonizer** (*Bucculatrix ainsliella*) was not observed in 1995.

Oak Sawflies (various) - Oak sawfly larval activity seemed to increase overall in 1995. Although there were a number of species involved, the **spiny sawfly** larvae (*Periclista* spp.) appeared to be the most common. An area of moderate to severe defoliation of several acres of red oak saplings by larvae of a species of **Argid sawfly** (*Arge* sp.) was reported from Vinalhaven Island in Penobscot Bay in August. A similar species was collected from a couple of adjacent mainland areas but defoliation there was light.

Orangehumped Mapleworm (***Symmerista leucitys***) - Defoliation of beech by the colorful larvae of this species was more widespread in 1995 than in 1994 across central and eastern Maine especially in Hancock and Washington counties. However, most of the defoliation was light to moderate and spotty rather than concentrated into any one area.

Moths of *Symmerista* spp. are monitored in our light trap survey but due to similarities in our three Maine species they are not separated into species. Collections of *Symmerista* spp. rose noticeably in 1995 (Table 19). While some of the rise could be attributed to *S. leucitys* much of it reflected increased numbers of the **redhumped oakworm**.

Table 19 . Total number of *Symmerista* spp. moths collected at light

	Year					
Location	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**
Allagash	0	0	0	0	0	0
Arundel					4	3
Ashland	0	0	0	0	0	2
Blue Hill *	0	0	1	6	32	33
Brunswick	4	8	0	1	5	17
Calais	5	1	3	0	0	41
Chesuncook	1	0	0	1	2	20
Clayton Lake	0					
Dennistown	0	1	0	0	0	0
Elliotsville	44	10	5	4	1	50
Exeter	0	1	0	1	3	15
Greenbush	3	0	0	0	0	10
Guerette	0	0	0	0	0	0
Haynesville	1	0	0	0	0	2
Kingfield	0	0	0	0	0	5
Matagamon	2	0	0	0		
Millinocket	9	0	0	0	0	4
Mt. Vernon **	3	2	4	4	23	141
No. Bridgton *	3	10	8	21	12	73
Rangeley	0	1	0	0	0	2
Shin Pond					0	26
South Berwick	18	13	30	4	1	5
St. Aurelie	0	0	0	0	3	0
Steuben	0	7	0	0	3	13
Topsfield	67	5	3	0	13	152
Washington *	3	6	9	10	44	322
Total Number of Moths	163	65	63	52	146	936
Total Number of Traps	24	23	23	23	24	24

Most catches probably *S. leucitys* except for the following:

* very likely *S. albifrons/canicosta*

** a mixture of both *S. leucitys* and *S. albifrons/canicosta*

Oystershell Scale (*Lepidosaphes ulmi*) - Populations of this scale on beech remained endemic in 1995. Damage from this and other pests such as **beech scale**, however, continues to be obvious in most stands and is exacerbated by drought and defoliation.

Pear Thrips (*Taeniothrips inconsequens*) - No damage to sugar maple from pear thrips feeding was reported in 1995 and populations were again barely detectable.

Pinkstriped Oakworm (*Anisota virginiensis*) - Both larvae and adults of this species were more abundant in 1995 than they have been for many years. This and the **redhumped oakworm** occurred primarily across southern Maine and within the oak/pine forest type. Most defoliation was light and spotty except for a few relatively small (< 5 A ea.) hot spots in Hancock, Kennebec and Lincoln counties. One homeowner in Chelsea (Kennebec County) reported that hundreds of moths of this species were covering the side of their home in late June! They appeared to be mostly males and probably were seeking females in wooded areas nearby.

Redhumped Oakworm (*Symmerista albifrons/canicosta*) - Both of these species occur in southern Maine and due to similarities between the two in all stages, our surveys have not separated them. Larvae known as redhumped oakworms were seen feeding on oak at scattered locations across southern Maine in 1995. Although low numbers have showed up in oak surveys in past seasons, defoliation was usually negligible. In 1995 we received reports of moderate to severe defoliation on scattered individual trees throughout the area. The numbers of moths collected through our light trap surveys (Table 19) reflected these increases.

Saddled Prominent (*Heterocampa guttivitta*) - No damage or larvae were observed in 1995. Moth catches in the light trap survey were again low (Table 20).

Table 20. Total number of saddled prominent (*Heterocampa guttivitta*) moths collected at light

	Year					
Location	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**
Allagash	8	4	1	3	1	1
Arundel					0	0
Ashland	0	0	0	0	1	0
Blue Hill	6	2	1	1	2	5
Brunswick	42	34	0	0	0	0
Calais	2	4	3	0	0	0
Chesuncook	51	10	12	13	10	37
Clayton Lake	4					
Dennistown	1	3	0	0	0	2
Elliotsville	6	5	4	4	0	0
Exeter	29	5	10	0	0	1
Greenbush	0	1	1	1	4	0
Guerette	0	1	0	0	1	0
Haynesville	0	0	0	1	1	1
Kingfield	0	0	1	0	2	0
Matagamon	7	0	1	0		
Millinocket	10	21	10	5	2	7
Mt. Vernon	21	32	19	1	1	13
No. Bridgton	0	41	15	9	2	0
Rangeley	0	10	4	0	0	1
Shin Pond					1	1
South Berwick	29	15	53	3	0	1
St. Aurelie	3	0	0	0	0	0
Steuben	4	3	17	28	1	3
Topsfield	7	5	11	4	0	7
Washington	3	50	23	1	0	0
Total Number of Moths	233	246	186	74	29	80
Total Number of Traps	24	23	23	23	24	24

Satin Moth (*Leucoma salicis*) - Satin moth larvae caused heavy defoliation (> 50%) of quaking and bigtooth aspen on 2,450 acres in Penobscot and Piscataquis counties in 1995 (Fig. 7 and Table 21). In both counties, defoliation mapped in 1995 was an expansion of areas defoliated in 1994 when 1,600 acres were defoliated. The intensity of defoliation also increased in 1995 as compared to 1994 levels. The satin moth has caused some level of defoliation in the same vicinity for the past 4 years. Ground observations within the defoliated stands this past fall revealed significant egg hatch and the presence of numerous parasite cocoons. Moth catches remained fairly stable (Table 22).

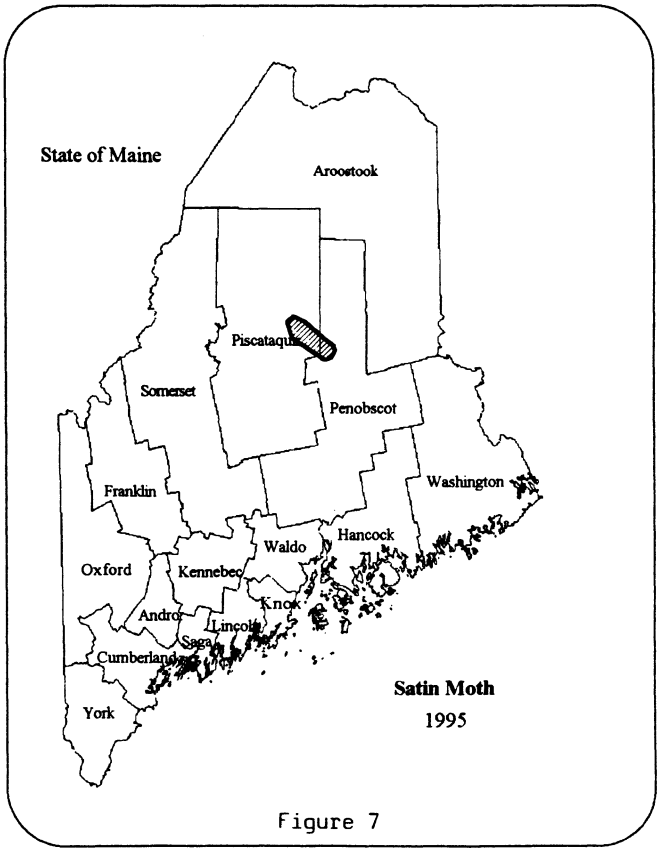

Figure 7

Table 21. Satin moth (*Leucoma salicis*) defoliation in 1995

County	Acres
Penobscot	350
Piscataquis	1,910
Total	**2,260**

Table 22 . Total number of satin moth (*Leucoma salicis*) moths collected at light

	Year					
Location	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**
Allagash	3	3	2	2	0	0
Arundel					0	0
Ashland	5	0	7	3	5	1
Blue Hill	0	0	0	0	9	2
Brunswick	2	0	0	2	0	0
Calais	6	5	0	0	3	2
Chesuncook	0	0	0	1	0	0
Clayton Lake	2					
Dennistown	2	3	1	5	1	0
Elliotsville	0	1	5	2	0	0
Exeter	0	0	0	0	0	0
Greenbush	1	2	0	0	1	1
Guerette	4	3	3	16	7	9
Haynesville	3	0	2	18	5	1
Kingfield	0	0	1	0	0	0
Matagamon	0	0	0	0		
Millinocket	1	5	17	3	4	0
Mt. Vernon	0	0	0	0	0	0
No. Bridgton	0	0	0	0	0	0
Rangeley	0	4	1	0	0	0
Shin Pond					14	0
South Berwick	0	0	1	1	0	0
St. Aurelie	0	0	0	0	0	0
Steuben	41	22	2	2	8	5
Topsfield	1	3	0	3	18	12
Washington	0	0	0	0	0	0
Total Number of Moths	69	51	56	53	75	33
Total Number of Traps	24	23	23	23	24	24

Spiny Elm Caterpillar (*Nymphalis antiopa*) - These spiny, black caterpillars were much more common in wooded areas of the state in 1995 than they were in 1994. Although high populations were very local and usually limited to one or at most a few trees, clusters of caterpillars could be found on trembling aspen and occasionally willow in many areas. Elm did not appear to be a common host this season. The most significant defoliation of trembling aspen was reported from Concord Twp. (Somerset County), Shawtown Twp. (Piscataquis County) and Hopkins Academy Grant (Penobscot County) where poplar saplings were denuded.

The spiny elm caterpillar is the larval stage of the attractive **mourning cloak butterfly** which overwinters as an adult. Mourning cloak butterflies were very abundant in some wooded areas in the spring of 1995.

Sumac Defoliation - Sumac, like alder, seems to be taken for granted until it becomes defoliated, then there seems to be some interest in it as there was in 1995 when numerous stands were stripped. By the time the defoliation was reported (August) most of the culprits had left but it appears that two or more insects were

involved. Throughout most of the state, the defoliator appeared to be a small lepidopterous larva (? Tortricidae?) and defoliation was messy with some wilted foliage remaining. In areas around Penobscot

Bay (Waldo and Hancock counties) a larger (based on droppings) creature seemed to be involved (? *Datana* or ? Argid sawfly) and the sumac were completely stripped.

We will be looking for this one in 1996. In the meantime any suggestions??

Tussocks (various) - Tussocks are fuzzy, variably-colored, caterpillars which often show up as defoliators of a variety of trees and shrubs. In most situations defoliation is light and the caterpillars are more of a curiosity. Occasionally, however, populations boom and defoliation becomes noticeable. The hairs of some species can also physically cause skin irritation (unlike those of the browntail moth which chemically cause a rash as well). This is especially true during periods of hot weather when **"caterpillar rash"** or **"tussockosis"** is not uncommon. Although the **hickory tussock** (*Lophocampa caryae*) **rusty tussock** (*Orgyia antiqua*) and **pale tussock** (*Halysidota tessellaris*) were relatively common in 1995 it was the **spotted tussock** (*Lophocampa maculata*) which stole the show. In many localities across southern Maine the fuzzy, bright-yellow and black caterpillars wandered about munching on a wide variety of greenery from alders to birch and boxelder. This in and of itself did not create a problem. It was not until school children began handling them that a problem arose. We received reports from health nurses from a number of towns from Lubec to Manchester expressing concern and surprise that such a rash could develop from such a cute creature. Although most of the tussock rash lasted only a day or so it did prompt some discomfort and in a few cases it lasted up to a week or more.

Variable Oakleaf Caterpillar (*Lochmaeus manteo*) - Populations of variable oakleaf caterpillar were very high in many of eastern Maine's beech stands early in their larval development period but larval numbers declined rapidly as they grew. This decline was thought to be due to high predator and parasite densities and also to very poor food quality due to extreme drought conditions in 1995. Because of these factors, numbers of late instar larvae, that cause most of the defoliation, were very low as was the resulting defoliation.

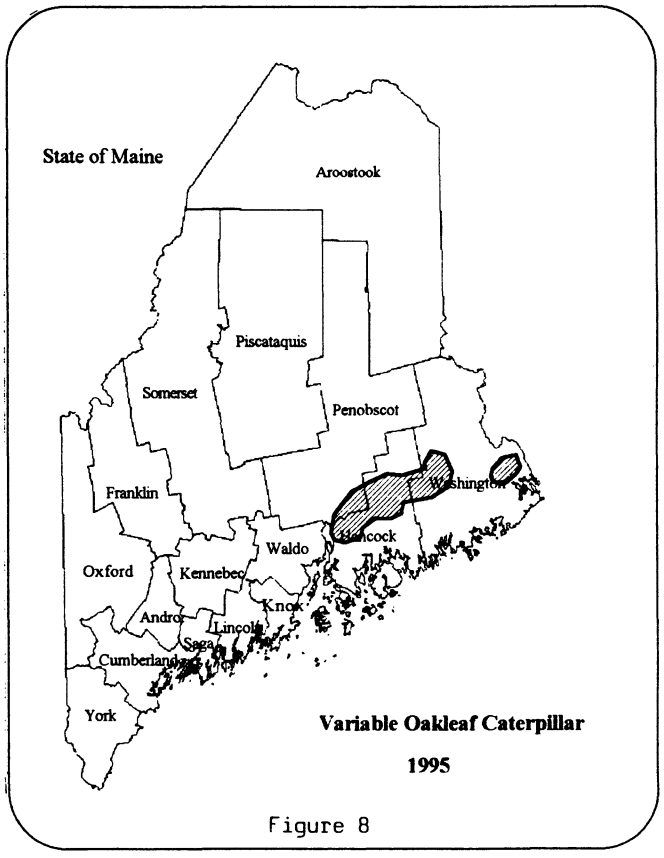

Figure 8

Mapping of variable oakleaf caterpillar defoliation was extremely difficult in 1995 for several reasons. Reduced defoliation intensity was a problem but in addition defoliation that did occur was often masked. Defoliation in most areas was heaviest in the lower crowns and defoliation in upper crowns never reached heavy levels due to the collapse in larval populations. This pattern of defoliation is often seen with this insect when populations are low or during the decline of an outbreak. Even though lower crown defoliation was significant,

undamaged foliage in upper crowns masked the damage and made detection from the air impossible. Mapping was also made more difficult by drought conditions in 1995. Drought caused premature discoloration and very early leaf drop in many areas. These conditions could easily be mistaken for defoliation if ground checks were not made. Finally, many beech stands in eastern Maine have experienced very high levels of dieback in recent years for numerous causes. This dieback could also be confused with defoliation.

An aerial survey conducted in August and September of 1995 showed considerable reduction in the area of beech and oak forest heavily defoliated (> 50%) by variable oakleaf caterpillar (Fig. 8). Only 3,100 acres of beech forest met the > 50% defoliation threshold and 8,200 acres were mapped in the moderate (30 to 50%) defoliation category. All the moderate and heavy defoliation in 1995 occurred in Washington and Hancock counties. Light defoliation (< 30%) was seen from the air and during ground observations but these areas were too spotty to map. The light defoliation was noted in about half of the area defoliated in 1994 (see Summary Report No. 9 p. 35).

The numbers of moths collected in our light trap survey in 1995 remained fairly stable at 1994 levels (Table 23).

Table 23. Total number of variable oakleaf caterpillar *(Lochmaeus manteo)* moths collected at light

	Year					
Location	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**
Allagash	0	1	1	0	0	0
Arundel					0	1
Ashland	7	10	6	0	1	14
Blue Hill	7	4	5	0	9	30
Brunswick	4	2	0	0	0	3
Calais	2	4	3	0	0	3
Chesuncook	0	1	0	0	10	62
Clayton Lake	0					
Dennistown	7	7	0	0	0	5
Elliotsville	87	175	42	5	0	57
Exeter	9	7	0	0	0	6
Greenbush	49	39	3	0	7	11
Guerette	2	1	0	0	3	1
Haynesville	94	86	21	6	39	14
Kingfield	192	158	14	0	7	7
Matagamon	17	13	1	0		
Millinocket	169	310	122	85	148	185
Mt. Vernon	0	2	0	2	12	1
No. Bridgton	5	6	0	0	3	0
Rangeley	5	3	0	0	0	4
Shin Pond					2	15
South Berwick	11	15	3	8	0	4
St. Aurelie	0	0	0	2	1	0
Steuben	3	3	0	0	2	3
Topsfield	316	302	250	83	235	50
Washington	23	2	1	0	2	17
Total Number of Moths	1,009	1,151	472	191	481	493
Total Number of Traps	24	23	23	23	24	24

White Ash Defoliator - A pyralid moth larva (*Palpita magniferalis*) was identified as the primary cause of noticeable insect defoliation of white ash over > 500 acres in Stockton Springs (Waldo County) in 1995. Much of the area was difficult to delineate as it was contiguous with a larger area of defoliation caused by the **ash leaf and twig rust**. Although this pyralid occurs throughout Maine, numbers are usually low. This is only the second time (the first being 1989 - see Summary Rpt. No. 4 p. 13) that significant and

observable defoliation has occurred in recent years. Much more localized defoliation (< 5 A ea.) was also reported in 1995 on brown (= black) ash at Grindstone and T2 R6 Herseytown (Penobscot County).

Willow Flea Weevil (*Rhynchaenus rufipes*) - Populations of this leaf miner were again high in 1995 and damage was noticeable across the state by August on black and weeping willow and balsam poplar. Populations were roughly at 1994 levels.

Willow Insects (various) - Aside from the willow flea weevil, there were a number of other species of defoliators that resulted in noticeable defoliation of willow locally in 1995. Of these the **green comma** (*Polygonia faunus*), **spiny-elm caterpillar** (mourning cloak), and **satin moth** were the more common although feeding by larvae of the green comma declined somewhat from 1994 levels.

Woolly Alder Aphid (*Prociphilus tessellatus*) - Silver maple infestations were down in 1995 as was the population in general although alder stem infestations were not difficult to find.

Miscellaneous INSECTS and other ARTHROPODS of Medical, Nuisance or Curiosity Significance in 1995

Ants (various) - There never seems to be a shortage of ants and 1995 was no exception. The **carpenter ants** (*Camponotus* spp.) were again the bane of homeowners as they threatened many domestic environments. Those pesky little mound forming lawn ants (several species) were also common and resisted many homeowner efforts at control. Smaller indoor species and an occasional problem with stinging ants (*Crematogaster* spp. and rarely *Myrmica rubra*) added to the diversity.

Ant flights also occurred throughout the season but the more massive ones were in late August and early September. We received a number of reports of dark, often funnel-shaped clouds of the **cornfield ant** (*Lasius alienus*) from a number of northern and central Maine localities.

Bark Lice or Psocids - (p. 22).

Euonymus Caterpillar (*Yponomeuta cagnagella*) - Defoliation was reported in 1995 from a number of previously infested euonymus hedges and ornamental plantings but populations appeared to remain fairly stable at 1994 levels.

European Grass Skipper (p. 26).

Grasshoppers (various) - Numbers of grasshoppers and crickets increased strikingly in many areas of the state but especially across southern Maine. In spite of these increases no reports of damage to trees or shrubs were reported.

Japanese Beetle (*Popillia japonica*) - Japanese beetle populations appeared on schedule in 1995. Adult activities in Augusta commenced during the last week in June and by August clusters of the voracious beasts could be seen on susceptible hosts (and there are many) in infested areas of southern Maine north to Bangor and east to Bar Harbor. Numbers were up in some cases and down in others.

Populations of the often associated but more widespread **rose chafer** (*Macrodactylus subspinosus*) appeared to be down in 1995. The **oriental beetle** (*Anomala orientalis*) was reported in 1995 from Saco (York County) to add to the other records of Gorham (Cumberland County) and Winthrop (Kennebec County).

Lady Beetles - Lady beetles are nearly everybody's favorites - that is until they disrupt household activities by descending in macabre numbers in the fall. Most of our lady beetles occur in lady-like fashion and are favorites of school children, gardeners and the like but the recently introduced **multicolored Asian lady beetle** (*Harmonia axyridis*) has taxed our fortitude by its sheer numbers. This Asian species, MCALB or Halloween beetle for short, occurred over most of the state in early October of 1995 for the second season. This seems surprising in view of the fact that most of us did not see a single larva during the field season! Where were they? We expect an exodus in the spring and will certainly be looking for larvae during the summer. One of the concerns of many of us is the impact this newcomer will have on those species of lady beetles which are already established. So far some of the more common species such as the **twicestabbed lady beetle** (*Chilocorus stigma*) which also feeds on arboreal aphids and scales has done well. Even the familiar **two spotted lady beetle** (*Adalia bipunctata*) still seems to find a niche to overwinter in around buildings. The other recent introduction, the **seven spotted lady beetle** (*Coccinella septempunctata*), however seems to be having a hard time and very few were seen in 1995!

Medical Entomology - Maine state government does not have a designated medical entomologist position. As a result MFS-I&DM staff receive requests for advice and assistance in dealing with an array of insect and other arthropod related problems. Included in these requests were questions relating directly to such things as **black flies, bot flies, deer flies, horse flies, mites, mosquitoes, spiders, stinging insects** and

ticks. Also included are vector related disease problems such as **eastern equine encephalitis**, **heartworm** and **lyme disease** and a series of **allergies**, **rashes** and **reactions**. The actual numbers of requests are not high but individual concern is often great. Disease questions *per se* are referred to medical professionals.

Biting fly populations throughout most of the state were variable but generally average in 1995-even those of the **saltmarsh mosquito** (*Aedes sollicitans*). Dry weather conditions during breeding time may have surpressed breeding activity of mosquitoes and the early season low level of many streams may have reduced the numbers of black flies. Horse flies and deer flies however did rather well.

Stinging insects were another story. High survival rates of overwintering queens followed by readily available food (especially honeydew from high numbers of aphids and pollen) made for many ambitious colonies early in the season. As dry conditions and reduced food became the norm by July, there were many "testy" yellowjackets around. Although there are an estimated 14 species of yellowjackets in Maine, most of the problems with people and stings seemed to involve the more aggressive **eastern yellowjacket** (*Vespula maculifrons*), **German yellowjacket** (*Vespula germanica*) and the **common yellowjacket** (*Vespula vulgaris*). There were stories of yellowjackets entering cars at traffic lights and stop signs, "nailing" people as they got out of their car or home, "heckling" customers at roadside fruit and vegetable stands, driving picnickers inside, entering soda cans and slowing down woods operations and farm crop harvests. Populations of yellowjackets were the highest seen since 1991.

Rashes related to insects generated numerous calls in 1995 primarily in response to expanded activities of the **browntail moth** in the Casco Bay area (Cumberland County) and populations of **tussocks** elsewhere. The browntail moth rash is by far the more serious concern. This rash is chemically and physically induced and the high populations of this species in concentrated areas (Casco Bay Islands) generated a serious level of dermal and respiratory discomfort. Although most residents in the infested area are familiar with the problem, it is nearly impossible to avoid the urticating hairs completely. While susceptibility to the rash varies, most individuals are affected. Rash caused by the **tussocks** on the other hand is mechanical and tends to be worse when individuals actually handle the caterpillars or contact their hairs when hot and sweaty. The worst cases reported in 1995 involved youngsters who handled the pretty and fuzzy spotted tussocks or their "fuzz ball" cocoons in the fall.

Spiders (various) - Spiders continue to generate interest - mostly from individuals who just don't like them. We continue to stress the point that nearly all Maine spiders are beneficial and avoid humans more than we avoid them. Most of our requests this past year again involved occasional home invaders such as the **barn spider** (*Araneus cavaticus*), **parsons spider** (*Herpyllus ecclesiasticus*), **grass spiders** (*Agelenopsis* spp.) and the large hairy **fishing spider** known as the **dark Dolomedes** (*Dolomedes tenebrosus*). Of the outdoor spiders the **black** and **yellow garden spider** (*Argiope aurantia*) and the white or yellow and pink **crab** or **flower spider** (*Misumena vatia*) topped the list. The only poisonous spiders which we seem to encounter with any regularity are those associated with vegetable produce brought directly into Maine from western or southern sources. One such instance in 1995 involved the discovery of a large, colorful, hairy wolf spider -type (to the untrained eye) **ctenid** (Ctenidae) from central America which had probably wandered from bananas into a shopping cart in Augusta. Although some members of this family can have a deadly poisonous bite, the rather starved female was more interested in food. She survived, was photographed and then sent along to specialists. In another instance at least one produce worker at another market in Waterville suffered a rather painful and disfiguring bite from one of the **sac spiders** (*Chiracanthium inclusum*) several of which came in from California on grapes.

Populations of one of the **rodent bot flies** (*Cuterebra* spp.) were higher than usual in 1995 and several homeowners became disturbed when the large white maggots made an exodus from the carcass of a recent feline acquisition in the home! We also received reports of an infestation rate approaching 50% for field mice and chipmunks trapped in selected areas!

Ticks (Ixodidae) - The number of ticks received for identification in 1995 (264) was up slightly from 1994 (250) and involved relatively high numbers of the **lyme** or **deer tick** (*Ixodes dammini/scapularis*). Numbers of the **American dog tick** (*Dermacentor variabilis*) were still high but our clients appear to be more sure of the identification of this species and tend to report it less frequently. Populations of both of these species still seem to be spreading slowly north and east. Larvae of the **moose** or **winter tick** (*Dermacentor albipictus*) were still common in November in some areas. Winter tick adults as well as one nymph were reported from dogs in two locations in 1995. Although most of Maine's thirteen or so species of ticks can be found nearly everywhere within the state, they are still more common in the southern half (Fig. 9).

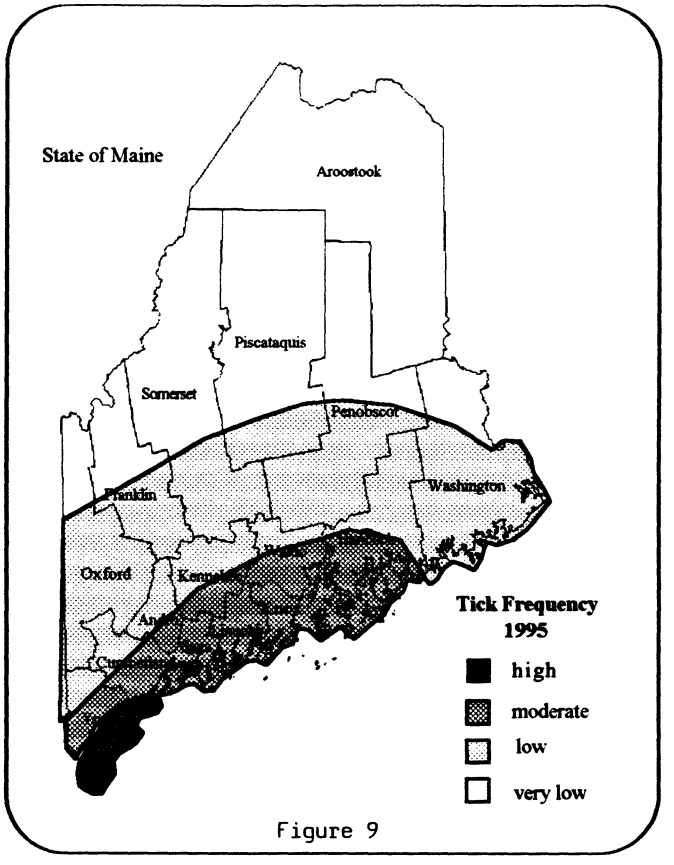

Figure 9

Lyme disease in Maine - It is still somewhat difficult to define the nature of this problem in Maine due to confusing qualifying criteria and data gathering problems. Suffice it to say that the incidence of lyme disease remains relatively low in Maine and is highest primarily in coastal areas. Figure 10 has been prepared by the Maine Lyme Disease Task Force to present the current status of the disease in Maine. Please note that any records for a county characterize the entire county as endemic (i.e. the records for Penobscot County are all from the Old Town area thus in reality only southern Penobscot County is endemic). It is also almost certain that Waldo County should also be considered endemic. Two other tick born diseases have recently been detected in Maine. In very preliminary surveys it now appears that the organism that causes HGE (Human granulocytic ehrlichiosis) has been found in ticks in coastal areas west of Belfast. No human cases have been reported. The organism which causes babesiosis in humans has also been found in a tick from one location.

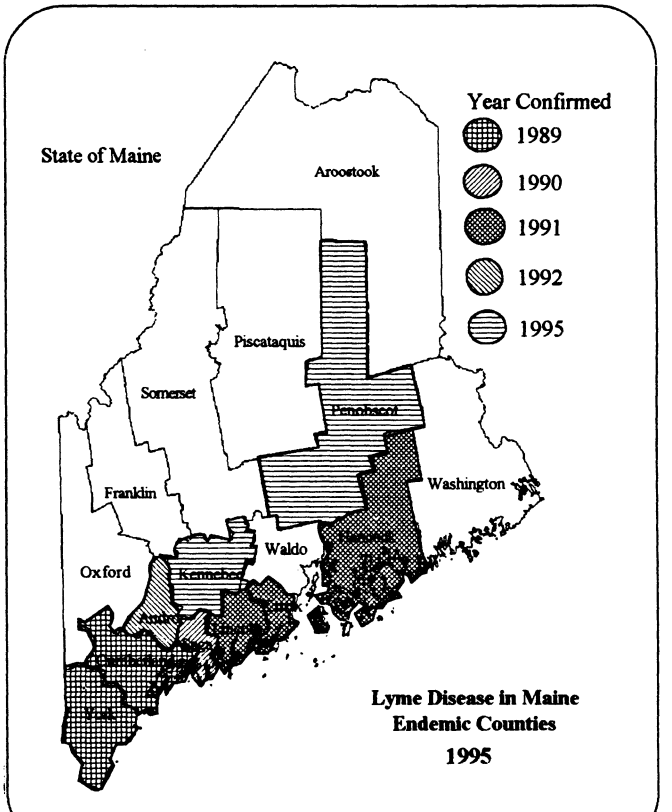

Figure 10

Miscellaneous Fall Nuisance Problems - There is often a surge of insect activity in the fall much of which appears to be more in the line of nuisance or curiosity than damage. Some of the more common problems were:

Clusterflies, crickets and **paper wasps** as they searched for winter quarters and **bees** and **yellow jackets** which became restless and obstreperous prior to breakdown of their colonies; **Milkweed bugs** (*Lygaeus kalmii*) and the similar (in appearance) **boxelder bugs** (*Leptocoris trivittatus*) as well as the **Asian lady beetle** and the **birch catkin bug** as they moved to homes attempting to seek hibernation sites. The birch catkin bug was abundant again on some birch with a heavy seed crop and several reports of individuals swarming over fallen leaves and sides of buildings were received. While they do no damage in homes they are considered unwelcome guests. Various **leaf** and **flea beetles** and **root weevils** also became a problem in and around homes in some areas.

Public Assistance - Each year the I&DM staff handle well over 1,000 different requests for advice and assistance in addition to specific surveys and project work. Table 24 gives a breakdown of many of the problems handled by Augusta I&DM staff in 1995 showing some of the diversity of requests. In addition to these tree oriented requests, I&DM staff also handled roughly 815 requests for assistance on ticks and other non-tree problems.

Table 24. Number of requests received in 1995 for advice and assistance about forest, shade tree, and ornamental pests.

PROBLEM	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Aphids	1		2		9	11	5	5	2			4	39
Balsam twig aphid	1			1	15	4	1	4	1		1		28
Bark beetles			1	1	3	1	7	7	3	1	3	4	31
Bark lice							2	8	1				11
Birch leafminers				1		2	4						7
Browntail moth			3		14	42	7	4		1	1	3	75
Dutch elm disease	1					3		1	2	1			8
Eastern dwarf mistletoe	2								1				3
European larch canker					1	1	2						4
Fall webworm								4					4
Forest tent caterpillar						3							3
Galls	1		1	3	2	4	3	1	1			1	17
Gypsy moth		1			2	5	6		1				15
Hemlock looper	2		1			1	2	1	1				8
Japanese beetles					1		4	4					9
Mites						4	2	2					8
Satin moth						3							3
Sawflies					1	4	12	10	6	2		1	36
Spruce budworm	2	1		2	1	2	1	1		1	1		12
Tent caterpillars					3	5							8
Variable oakleaf caterpillar							2	4	3				9
White pine blister rust			1	1	5	4	1	2	2	1			17
White pine weevil					1	1	7	13	3			1	26
Woodborers			1		1		7	7	3	2	1	1	23
Other requests	**36**	**15**	**28**	**28**	**49**	**110**	**98**	**110**	**74**	**35**	**12**	**12**	**607**
Total	**46**	**17**	**38**	**37**	**108**	**210**	**173**	**188**	**104**	**44**	**19**	**27**	**1,011**

Rose Stem Girdler (*Agrilus aurichalceus*) - This serious introduced pest of roses was found associated with rugosa rose at a number of locations in Androscoggin, Cumberland, Lincoln and Sagadahoc counties in 1995. Damage was severe in some plantings.

Viburnum Leaf Beetle (*Pyrrhalta viburni*) - The first report of activity by this species in Maine was received in 1994 on maple-leaved viburnum in the Portland (Cumberland County) area. Populations were already very heavy when first seen and many shrubs had already been stripped. Later reports of larvae, adults and damage were received from viburnum (high bush cranberry-a viburnum) in Saco (York County) and in the Fairfield-Waterville (Kennebec County) area. The species was recovered from the same areas in 1995 and confirmed as this species by specialists.

DISEASES and INJURIES Associated With Trees in 1995

Acid Rain (caused by certain pollutants entering the atmosphere and reacting to form sulfuric and nitric acids) - This subject has received much play in the popular media over the years but most reports of damage are unfounded and easily attributable to other causes. But the misconception persists that acid rain is significantly destructive to forest vegetation. Each year we receive calls expressing concern about the effect of acid rain on Maine forests.

Recent research has concluded there is no evidence of general, widespread decline of forest species due to acidic deposition, though there may be local effects due to acid fog at certain coastal or high elevation sites in the northeast. There may also be subtle effects of acid deposition such as increased nutrient leaching from soils which may negatively impact tree growth. And there is the possibility that effects of acidic precipitation may increase the susceptibility of trees and other plants to certain diseases.

Air Pollution Injury (caused by various air contaminants, especially ozone) - Ozone damage to forest vegetation was very slight in 1995 for the second consecutive year. Of 32 forest health monitoring plots checked for ozone damage in 1995, only two (Dixmont and Parkman) displayed symptoms, and those symptoms were rated trace to light. Last summer's drought conditions are thought to have reduced ozone symptoms throughout New England.

Air pollution injury to forest vegetation in general is much less pronounced now than it was in the sixties and early seventies, probably due to a general reduction in sulfur dioxide emissions by industry in the northeastern United States. But there is still the potential for high levels of ozone injury to vegetation due to the capriciousness of weather systems. Unlike sulfur dioxide which acts directly and tends to be produced in finite amounts by industry, ozone is produced over time by the action of sunlight on certain by-products of combustion. Weather conditions can vary to produce either relatively little or great quantities of ozone depending on the sunlight, humidity, and temperature regimes which exist as air masses pass through the state during the growing season.

Annosus Root Rot (caused by *Heterobasidion annosum* syn. *Fomes annosus*) - We received no new reports of this disease during 1995, but several plantation managers inquired about control practices involving use of granular borax as a stump treatment. They were particularly interested in the timing of treatments, both in terms of time of year and need for immediacy following harvest.

It is important to treat stumps immediately following tree harvest. *Heterobasidium annosum* is a pioneer organism that colonizes freshly cut stumps. The borax must be present on the stump before the organism has a chance to invade.

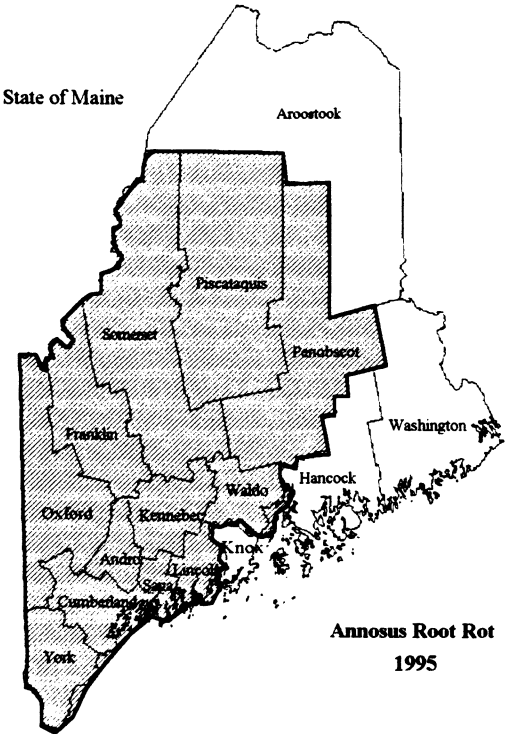

Figure 11

We recommend borax treatment of freshly cut stumps at all times of year, but clearly the hazard is greatest in the fall when spores of the causal organism are being abundantly released. If possible, it is best to schedule harvest for other times of the year. But if managers must harvest in the fall, we strongly recommend stump treatment. Infection hazard is probably much reduced during winter months, but stump treatment even then is still probably worthwhile.

This is primarily a disease of plantation pine in Maine. To date we have recorded infected plantations in the following counties: Androscoggin, Cumberland, Franklin, Kennebec, Lincoln, Oxford, Penobscot, Piscataquis, Sagadahoc, Somerset, Waldo, and York (Figure 11).

Apple Scab (caused by *Venturia inaequalis*) - One of the most common non-forest diseases we encounter when responding to calls from the public is apple scab. Perhaps the most serious disease in commercial apple orchards, apple scab also defoliates and causes lesions on leaves, stems, and fruits of ornamental crabs. This is a fungal disease which is generally worse during moist seasons.

Control by spraying fungicides is possible, but the repeated applications which must be timed 7-10 days apart during wet weather become tedious even for commercial growers. A more practical approach for homeowners involves the raking and destruction of fallen leaves and fruits in the autumn, and the planting of resistant varieties. Among those types said to be resistant are the cultivars 'Adams', 'Baskatong', 'Beverly', 'Bob White', 'David', 'Dolgo', 'Donald Wyman', 'Henry Kohanke', 'Liset', 'Ormiston Roy', 'Professor Sprenger', 'Red Jewel', and 'Sugartyme', and the species *Malus floribunda, M. sargentii,* and *M. tschonoskii.*

Armillaria Root Rot (caused by *Armillaria* spp.) - This disease, known also as **shoestring root rot**, is caused by an opportunistic fungus which may attack and kill hardwood and softwood trees of all ages. This organism frequently infects balsam fir, black spruce, and red spruce in Maine, and is a contributing factor to the "sudden death" of balsam fir known as **Stillwell's Syndrome**.

Trees and shrubs affected by Armillaria root rot at first show a decline in vigor, then exhibit yellowing or browning of foliage, followed by defoliation (in hardwoods) and death. Evergreens usually die with brown needles still attached. Beneath the bark at the base of infected trees a white mycelial (fungal) "fan" may often be observed. Shoestring like fungal strands may also be observed by peeling away bark and often, in the early fall, honey colored mushrooms may be observed at the base of affected trees.

Ash Leaf and Twig Rust (caused by *Puccinia sparganiodes*) - This disease, which was last epiphytotic (epidemic) in Maine from 1982-1984, is again on the rise. If past history is any guide, we expect extensive defoliation of white and green ash in most coastal areas of Maine during July of 1996 with the epiphytotic continuing into subsequent years.

During 1995, trace to light infection of leaves and petioles of white ash occurred along all but far downeast sections of the Maine coast, and inland for up to thirty miles. But a pocket of moderate to severe infection occurred in certain coastal areas from Islesboro inland through Stockton Springs to Winterport. In those areas some trees experienced complete defoliation before generating limited amounts of new growth in mid to late summer.

The trend for this disease is now apparently up and if weather conditions are favorable for infection next June, this disease is expected to be spectacular throughout coastal Maine in 1996.

Ash, Maple, and Oak Anthracnoses (caused by *Apiognomonia errabunda, Kabatiella apocrypta,* and *Discula quercina* respectively) - These diseases, which cause irregular tan or brown spots or blotches on leaves often followed by defoliation, were more prevalent than normal in 1995. Of the three diseases, maple anthracnose was the most commonly reported, with specimens submitted from South Harpswell, Portland, Augusta and Sinclair among other locations.

It is difficult or impossible to identify long term trends for these diseases since their relative abundance in any one year is primarily dependent on moisture conditions during periods of leaf expansion.

Ash Yellows (caused by a mycoplasmalike organism) - We have never observed typical ash yellows symptoms in Maine and have long presumed the disease is not present here. Until recently, though, we had never surveyed specifically for this disease. However as part of our cooperative study into the cause(s) of brown ash decline with the University of Maine, Dr. Bill Livingston tested specimens of brown (black) ash for the possible presence of the ash yellows causal organism. Findings were negative and we continue to believe that ash yellows is not a problem in this state.

Atropellis Canker (caused by *Atropellis tingens*) - Atropellis canker is a relatively uncommon fungal disease of pines in Maine which is occasionally a problem in Scotch pine plantations and natural stands of pitch pine, particularly in the southwestern part of the state. This disease is characterized by sunken, perennial cankers on twigs, stems and branches. Wood beneath cankers is darkly stained bluish black in color. The bluish black stain often appears wedge-shaped when cankers are viewed in cross-section. Affected branches flag and needles turn brown in spring and early summer.

We received no new reports of this disease in 1995. The disease is potentially damaging to pines in Christmas tree plantations but usually is not much of a problem in Maine where relatively few pine species are now grown for Christmas trees. Where pines are planted, Atropellis free planting stock is generally used and plantations are rarely established near infected natural stands so chances for infection are remote.

Balsam Fir Tip Blight (caused by *Delphinella balsameae* syn. *Rehmiellopsis balsameae*) - This disease, which may cause occasional current year shoots of balsam fir to shrivel and die in late spring, was unusually severe in 1995 in some plantations of Colorado white fir (*Abies concolor*).

The trend for this disease has been up in recent years, especially in older white fir plantations. Particularly hard hit in 1995 were plantations in Monmouth, Orrington, and Waldoboro.

Balsam fir growers may in most cases safely ignore this disease, but once it becomes epiphytotic in a concolor fir plantation growers will need to employ a stringent fungicide program or perhaps even give up culture of the species.

Bird Damage (caused by various avian species) - Bird damage to trees can take many forms and is often serious. In recent years we have noted the extensive damage to trees caused by sapsuckers, other species of woodpeckers, and pine grosbeaks. We have noted the less extensive but still significant damage caused by various species of songbirds in Christmas tree plantations where they break potential leaders from trees when they attempt to perch on tender, emerging growth in the late spring.

Sapsucker damage is easily recognizable by the regular, evenly-spaced holes the birds have pecked through the bark. Holes are characteristically pecked in rows which may be both horizontal and vertical. Mountain ash (*Sorbus* spp.), hemlock, and birch are very commonly attacked, but many other species are utilized by sapsuckers as well.

Pine grosbeaks damage trees in winter by feeding on buds in the terminal bud cluster of pines, often causing trees to fork when growth resumes the following spring. This may reduce their utility as future saw logs unless corrective pruning is employed.

Black Knot of Cherry (caused by *Apiosporina morbosa*) - This disease is common in forest situations throughout the state on wild cherry trees and is particularly conspicuous on black cherry where galls a foot or more in diameter may occur. Where these galls occur on the main stem the value of cherry for lumber is

considerably reduced. Damage often extends internally well beyond the galled area, because the gall canker serves as an entry point for wood decay organisms which spread internally over time. In 1995, we recorded this disease in 16 of 105 forest health monitoring plots.

Frequently we receive reports of black knot infections on cultivated peach, cherry or plum trees in landscape or home orchard situations. All too often by the time we are consulted the disease has progressed to such an extent that the usual control practice of pruning knotted twigs and branches to remove infected tissue would essentially reduce the tree to a stump. It is important to diagnose this disease early, prune any knotted twigs each year before April 1, and spray if necessary with the fungicide thiophanate methyl in order to maintain healthy, productive fruit trees.

Boxelder Canker (caused by ? *Fusarium lateritium*) - This disease, which was very noticeable in 1991, was severe again in 1995.

In late June crowns of affected trees became conspicuously flagged with branches bearing dead leaves. Small stem cankers were common on new growth while larger, perennial cankers occupied larger branches. While this disease apparently causes no mortality, it is capable of transforming a tree of limited ornamental value into an outright liability in the landscape.

Brown Ash Decline (cause unknown but probably related to adverse site conditions) - Brown (black) ash throughout Maine continues to show symptoms of severe decline but most study plots for this disease seemed to exhibit improved foliage quality in 1995. The general decline in brown ash crown condition, expressed as twig and branch dieback as well as small and chlorotic foliage, was first detected in 1989 and was evaluated on a network of plots scattered throughout Maine. MFS, I&DM technical report No. 33 (May, 1994) describes the occurrence and condition of brown ash in Maine in 1993. Thirty four plots from the original network of 56 were reevaluated in 1995 to determine if observations of improved tree condition could be verified by crown condition data. The same trees and variables employed in 1993 were used in the 1995 evaluation. Analysis of the 1995 data is not complete, but preliminary assessment suggests improvement in some crown condition variables.

Following the initial evaluation of brown ash decline by the I&DM staff, the Division entered into a cooperative agreement with Bill Livingston of the University of Maine to study the relationships between the dendrochronology of brown ash in affected plots and stressors thought to be important in brown ash decline. I&DM staff felt that the relationships of brown ash to water and site conditions were important factors in the decline. Assessment of 6 plots in 1994 showed decline in brown ash trees was strongly related to fall floods followed by hard freezes on open ground and also to spring drought conditions. To test and verify these relationships I&DM assisted in similar evaluation of ash plots containing a wider range of dieback conditions. Analysis of these data is ongoing.

Bud Abortion of Balsam Fir (caused by low ambient air temperatures prior to budbreak) - This symptom was uncommon during the spring of 1995 due to relatively mild temperatures throughout the period of bud expansion prior to budbreak.

Butternut Canker (caused by *Sirococcus clavigignenti-juglandacearum*) - Butternut canker, a disease which has virtually eliminated butternut in the Carolinas, was first found in Maine in 1993 when we located the disease in Kennebec, Lincoln, Sagadahoc and Waldo counties. We continued to survey for this disease in 1994 and were successful in locating it in Androscoggin, Cumberland, Franklin, Knox, Oxford, Piscataquis, Somerset and York counties. Then, in 1995, we successfully located butternut canker infections in Aroostook, Hancock and Penobscot counties (Figure 12). Surveys in Washington County have so far been negative, but there is very little butternut available to sample in that part of the state.

Butternut canker is characterized by dying branches and dead tops, epicormic branches, discolored bark which may ooze a thin black inky fluid in the spring, and cankers on the main stem, buttress roots, and

branches. When bark in cankered areas is physically stripped away, the sapwood beneath exhibits dark brown, spindle-shaped, stained areas.

No effective controls are available to halt the spread of this disease at this time. Logging injuries should be minimized when harvesting. In nurseries, and perhaps in some homeowner situations, application of fungicides may be appropriate. In some states, butternut harvesting guidelines and even harvesting moratoriums are now in effect. There is considerable evidence that resistant individual butternut trees exist within the native population and researchers are now beginning to develop strategies to exploit that resistance to protect the species.

The trend of this disease was clearly up in 1995 and is expected to continue so in the foreseeable future.

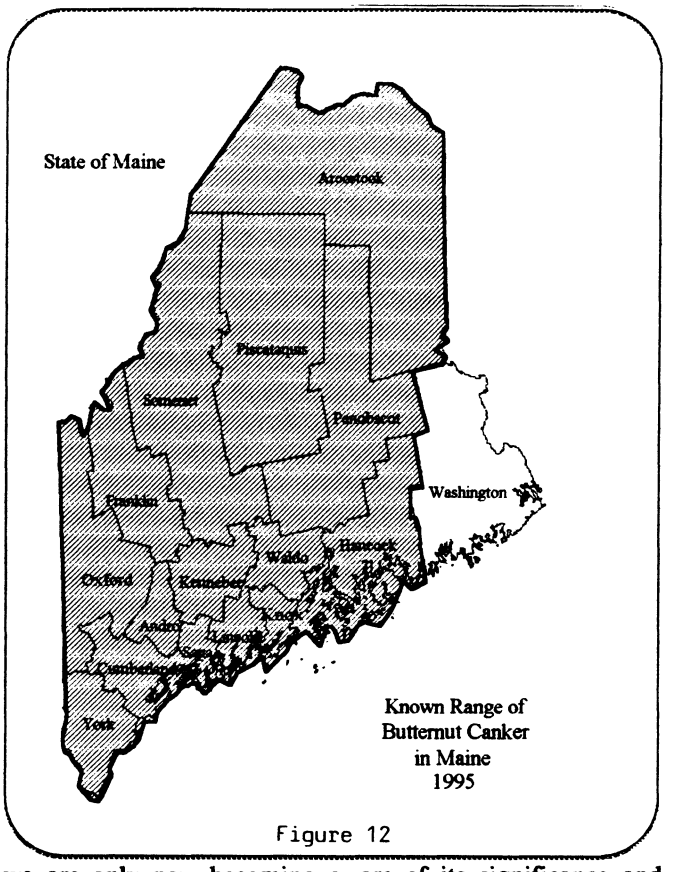

Figure 12

Caliciopsis Canker (caused by *Caliciopsis pinea*) - This is a generally minor, but occasionally important disease of eastern white pine which is often overlooked. Though we have known about this disease for many years, we are only now becoming aware of its significance and widespread occurrence in Maine. Every year we receive a few inquiries about cankered trees in stagnated white pine stands, and frequently we diagnose Caliciopsis canker as the cause.

Cankers may occur anywhere on tree trunks or suppressed branches and usually occur only in small numbers on a single tree. However, severely attacked trees may contain as many as several hundred cankers. Cankers may be superficial or they may extend into the cambium, killing it.

This is primarily a disease of stagnated stands or suppressed trees in dense stands. It may be effectively managed through judicious and timely stand thinnings.

Chemical Injury (phytotoxicity due to chemical pesticide application) - We received many reports of chemical injury to trees and shrubs in 1995. Growers and landscape managers should be especially alert to the possible phytotoxic effects of certain pesticides when applied to tender, emerging plant foliage. Certain evergreens are quite susceptible, especially when applications involve emulsifiable concentrates, mist blower applications, and/or treatment during hot weather. We have repeatedly warned balsam fir Christmas tree growers to be careful of Diazinon AG 500 and Lorsban 4 E when applying them during late May and early June.

The most commonly reported type of chemical injury in 1995 involved applications of weed killers to lawns within the root zone of susceptible evergreen ornamentals. Injury to blue spruce was especially common both to full size landscape specimens as well as the dwarf types (e.g. *Picea pungens* 'Montgomery').

Also commonly reported was damage due to improper calibration of spray equipment. Nursery managers and plantation owners using tractor mounted sprayers moving at constant speed generally do a good job of

pesticide application. But homeowners and others using handheld spray equipment often get into trouble by directing too much spray mixture into a confined area for too long a period. This is a problem which is especially common when residual herbicides are applied. Even if a spray mixture is properly prepared, the amount of chemical applied will vary with the duration of spray application. A constantly moving calibrated sprayer will deposit the appropriate quantity of active ingredient within the target area. But a stationary, hand held nozzle will continue to deposit active ingredients in one spot and, if it operates a moment too long, phytotoxicity to desirable plants may result.

Chestnut Blight (caused by *Cryphonectria parasitica*) - This disease, which was introduced to North America around 1900 on nursery stock of oriental chestnuts, subsequently spread into Maine and quickly destroyed our native American chestnut resource. A few infected trees persist, often sprouting from old stumps, and occasionally a seedling will grow to considerable size in the woods before succumbing to the disease. American chestnut trees planted as landscape specimens also frequently attain considerable size before fatal infections develop.

Recently considerable interest has been expressed in support of an effort to reintroduce the American chestnut into Maine forests. The expectation is that resistant trees may be available for distribution within a few years.

The American Chestnut Foundation has been at work for many years attempting to backcross the genetic resistance to chestnut blight of Chinese chestnut (*Castanea mollisima*) into the American chestnut (*Castanea dentata*). The goal is a tree which is 15/16 American chestnut, indistinguishable from pure American chestnut in growth form while retaining genes for resistance contributed by *C. mollisima*. Other institutions are at work exploring related approaches to control.

The Maine effort toward reintroduction is being spearheaded by General Clayton Totman of Waldoboro with support from various state agencies including MFS, and interested citizens.

Cold Temperature Injury to Overwintered Planting Stock - Several garden centers contacted us last spring concerning potted landscape stock which did not perform well when outplanted. Even unsold stock under favorable maintenance regimens at garden centers in some cases withered and died.

No significant pathogens could be identified but symptoms were characteristic of cold temperature injury to root systems. Potted shrub stock broke bud normally but new growth soon withered. Upon close inspection root systems were found to be already dead.

We suspect the potted planting stock had been overwintered off the ground so that natural soil warmth was not available to maintain root ball temperatures at adequate levels. Even such hardy sorts as *Arctostaphylos uva-ursi* were affected.

It is suggested that garden center operators inquire of suppliers about their stock overwintering practices. Operators should be prepared to change suppliers if the problem persists from year to year.

Conifer-Aspen Rust (caused by *Melampsora medusae*) - This disease, known also as poplar leaf rust, was reported to us in early June from a seed orchard in Unity where it was causing trace to light infection of eastern larch (*Larix laricina*). Infected larch needles had turned yellow and bore yellowish-orange pustules. Yellow to orange spots were also becoming apparent on leaves of nearby wild poplar trees (*Populus tremuloides*), but infection throughout the season remained at trace to low levels.

Seed orchard managers expressed concern about the need to manage the disease on site, but the impact on larch from this disease is generally minimal. Hybrid poplar is often quite susceptible, and under extreme epiphytotic conditions susceptible poplar hybrids may be defoliated. Growth reduction of infected hybrid poplar is not uncommon.

Seed orchard managers growing hybrid poplar for clonal propagation might be well-advised to eliminate nearby stands of larch. But seed orchard managers raising larch for seed production probably need not be too concerned with the presence of native poplars nearby. If our observations over time prove otherwise, we'll let you know.

Construction Injury (caused by heavy machinery and fill during construction activity) - We had several calls in 1995 relating to construction injury. Some of the damage was recent; other damage was of long standing.

Most readers of this newsletter are well aware of the long term impacts of construction damage, not only directly to boles of trees which are designated to remain as part of the landscape, but also to their root systems as heavy equipment passes over them breaking and macerating roots. Commonly adding the problem are subsequent changes in grade, especially where roots are buried by fill from a few inches to many feet deep.

We received calls directly related to construction injury from Cape Elizabeth, Gray and Brunswick in 1995, but noted the problem at many residences when responding to calls to identify other diseases. Our readership unfortunately does not include many in the construction industry, and we generally respond to homeowner concerns as trees decline 3-5 years after contractors and heavy equipment have left the area.

Homeowners contemplating new home construction would be advised to fence off completely during construction those areas where trees are to be retained. Leave those as natural areas. Areas to be graded or filled to become lawn are best planted to new trees once construction activity is completed. Construction of small wells around tree trunks and use of shallow, coarse fill over tree roots may be successful but is best avoided if possible.

Cristulariella Leaf Spot (caused by *Cristulariella* spp.) - This disease, which caused extensive leaf spotting and defoliation especially of boxelder in south central Maine in 1990, has since all but disappeared. Apparently the weather conditions which favor this disease, consecutive hot, summer days and nights with high dew points, have not recurred in Maine since that time.

Dogwood Anthracnose (caused by *Discula destructiva*) - Dogwood anthracnose, a serious disease of native flowering dogwood in the northeastern United States since the late 1970's, was first found in Maine in 1992. Surveys for this disease since that time have failed to locate the disease outside of York County (Figure 13). While it apparently does not occur in the only natural stand of flowering dogwood known to us in Maine (on Mt. Agamenticus in Kittery), the disease has been found to be present on ornamental flowering dogwood in York Village and in Kittery. Our native dogwoods other than *Cornus florida* appear

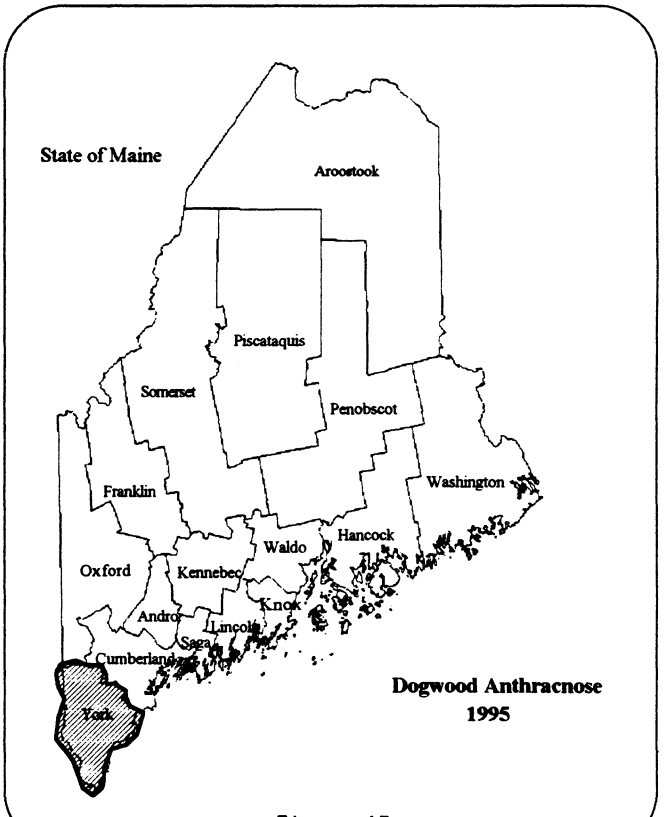

Figure 13

to be resistant to this disease, so it seems unlikely that the causal organism will spread around the state on other species.

The trend of this disease at the present time is static.

Drought - Precipitation amounts were below average throughout Maine during the 1995 growing season and drought effects were pronounced on forest and landscape trees, especially in newly established plantations. In general native species fared somewhat better than exotics, but even native species on sites which were sandy or shallow to ledge suffered greatly.

We fielded countless calls from the news media asking us to anticipate summer drought effects on the forthcoming fall foliage display. We expected fall colors to be somewhat muted, and on the droughtiest sites in southwestern Maine that was the case. On better soils in other parts of the state fall foliage was quite good, even spectacular. The effect of the hot dry weather in accentuating anthocyanin expression (the resultant red colors) was particularly striking in red oaks in much of eastern coastal sections.

In the long run, drought effects will be expressed as tree dieback and increased susceptibility to insects and disease, with mortality often resulting. It may take many years of normal and timely rainfall for drought stressed trees to fully recover.

Dutch Elm Disease (caused by *Ophiostoma ulmi* and *Ophiostoma novo-ulmi*) - Symptoms of Dutch elm disease were quite conspicuous throughout Maine during 1995 and generated numerous inquiries of our staff. The hot, dry Monday of June 19, 1995 kicked off symptom expression with a "bang".

Many old elms which escaped the initial wave of infection now succumb each year, at least partially the result of the development of more aggressive strains of the disease organism. While protecting these older specimens is the concern of most of our clients, we occasionally receive calls regarding mortality of younger elm trees (4-8" dbh and 20-30 feet tall). Such trees are frequently numerous in old field areas, the progeny of susceptible old elms now long gone. The progeny are, of course, also susceptible to Dutch elm disease and, due to their high numbers and density, are extremely vulnerable to mini-epiphytotics (epidemics).

Problems arise when such areas become developed into residential lots. Often the predominant tree species on such sites, there is a tendency to include the small elms in landscape plans, sometimes with disastrous results. In one recent case, young elms were used to provide the sole canopy for a collection of shade loving plants, the planting having been completed just as Dutch elm disease became epiphytotic on the site.

Control of this disease remains a challenge for arborists and others in the green industry. Planting of resistant cultivars, derived from European or Asiatic sources, is a practical approach. While injections with systemic fungicides and sprays for bark beetle control may provide some level of protection for native elms, these techniques should be combined with a systematic program of sanitation (removal of nearby dead or dying trees) in order to be really effective.

Eastern Dwarf Mistletoe (*Arceuthobium pusillum*) - Severe damage as the result of infection by this parasitic plant is still occurring in stands of white spruce in coastal areas of Maine. Trees of landscape value succumb each year in the yards of coastal residences as this organism gradually drains trees of their vigor. Removal of witches' brooms (infected portions of branches), together with appropriate fertilization, generally helps to maintain the vigor of affected landscape trees.

Dwarf mistletoe also frequently occurs on black spruce, particularly in bogs, and on red spruce in forest situations. Brooms on red spruce are often more poorly developed than on white or black spruce and may be overlooked. However infected residual trees left during timber harvesting activity can result in the

infection of spruce regeneration. Infected trees should therefore be identified if possible and removed during the harvesting operation.

During 1995, calls for assistance in controlling dwarf mistletoe in residential situations came from Bristol, Boothbay Harbor and Pemaquid. It was not reported from any of the forest health monitoring plots surveyed.

Entomosporium Leaf Spot (caused by *Entomosporium mespili* syn. *Fabraea maculata*) - We received no specimens of this disease in 1995, perhaps the result of a dry summer season which produced few opportunities for secondary infections to develop.

However in cool, wet seasons epidemics frequently occur and plants highly susceptible to this disease may be totally defoliated by mid July. Among the plants susceptible to this disease are English hawthorn, mountain ash, cotoneaster, and quince.

Resistant hawthorns are available in the trade, the Washington hawthorn (*Crataegus phaenopyrum*) being among the best. English hawthorn is very susceptible and may require the application of fungicides for effective control. Mancozeb and chlorothalonil are registered in Maine for this purpose. Where this disease is a problem, cultural controls such as raking fallen leaves to reduce inoculum in subsequent years is often helpful. Sprinkler irrigation in nurseries and summer pruning should be avoided.

European Larch Canker (caused by *Lachnellula willkommii*) - European larch canker is a fungal disease which originated in Europe and was first found on native larch (tamarack) in southeastern Maine in 1981. Information gathered from existing cankers indicates the disease has been present in Maine since at least the 1960's. This disease may infect any species of the genus *Larix* or *Pseudolarix*. Since larch canker has the potential for causing serious damage to both native larch stands and reforestation projects utilizing non-native larches in Maine and elsewhere, the disease is under state and federal quarantine (Figure 14).

Each year we survey a few towns close or adjacent to known infested areas to check for evidence of disease spread.

MFS surveys in 1995 in Tremont, Bass Harbor, Bar Harbor, Trenton, and Lamoine all proved negative, although USDA-APHIS has located a cankered tree in Lamoine with suspicious fruiting structures. We will follow up to see if the larch canker fungus is responsible.

The trend for this disease is static.

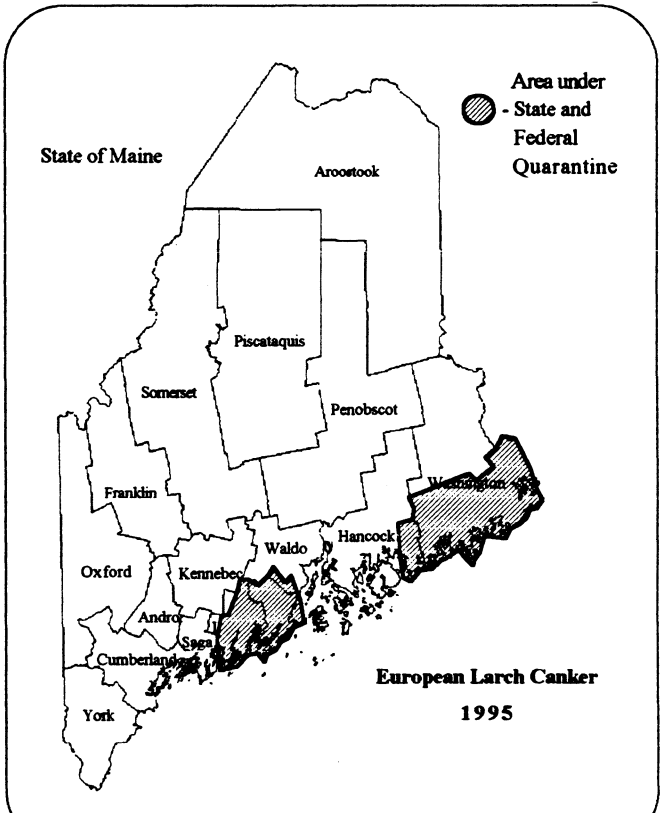

Figure 14

Fir-Fern and Fir-Fireweed Rusts (caused by *Uredinopsis mirabilis* and *Pucciniastrum epilobii* respectively) - These two diseases were unusually heavy in 1995 and in some cases affected the salability of balsam fir Christmas trees. Concolor fir was extensively infected as well, both in Christmas tree plantations and in residential plantings. We received specimens of fir-fern rust on concolor fir from Lincolnville, China, and Mt. Vernon; fir-fireweed rust on balsam fir from Minot and Ft. Fairfield; and fir-fern rust on balsam fir from Wytopitlock, Monmouth, Augusta, Windsor, Garland, Belgrade, Auburn, and Searsmont.

While it is possible to spray for control of these diseases (Bayleton at bud break) we recommend eradication of alternate host plants instead. Eradication is a more permanent solution and may be accomplished through use of glyphosate (Roundup) at two oz. per gallon of water applied in July to all sensitive fern and fireweed within 50-100 feet of fir to be protected. Retreatment may be required the following year for complete control.

Fir at distances greater than 100 feet may become infected but infection levels are usually tolerable. Most affected needles drop during the course of the summer and, except for very heavily infected trees, merchantability is not affected.

Hardwood Decline (caused by multiple stressors) - The decline of hardwoods in northern Maine which we first reported several years ago continued to intensify and expand in 1995 (Fig. 15). Severe drought conditions statewide contributed to unusually early fall coloration and leaf drop in hardwood stands, including those with dieback/decline symptoms. Not only has the drought increased stress on affected trees in northern Maine, but many stands of beech in central and eastern Maine have now experienced several years of moderate to severe defoliation by the **variable oak leaf caterpillar**, and the combined effects of insect damage and drought stress have increased the area of hardwood decline symptoms to now include portions of central and eastern Maine as well.

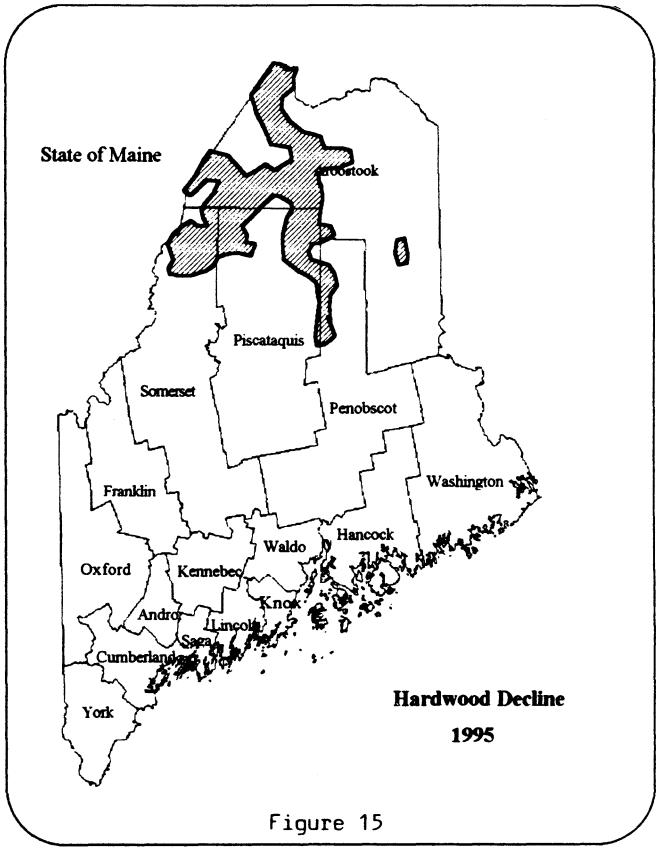

Figure 15

Heat Injury (caused by the sudden onset of hot weather in June) - This phenomenon, which was severe in June of 1993, appeared again in 1995. Though much less severe, shoot tips wilted and turned reddish brown on scattered trees in late June and early July, especially on the south sides of trees. Damage probably occurred on June 19. Injured growth gradually weathered from trees as the season progressed, and did not affect tree merchantability.

Heavy Seed Production - Some years are noted as seed years, where one or more species of trees produce fruit in unusual abundance. This was not the case for 1995 and we received only one call regarding heavy seed set (from Bath on red maple). Christmas tree growers were largely spared the tedious task of removing cones from balsam and fraser fir trees.

At this writing it does not appear that 1996 will be a big cone year, at least for balsam fir.

Horse-chestnut Leaf Blotch (caused by *Guignardia aesculi*) - This disease seems to occur every year wherever horse-chestnut grows in Maine. In 1995, the expression of disease symptoms was conspicuous, but not extreme. Damage, although aesthetically objectionable, is not generally considered serious.

Hypoxylon Canker (caused by *Hypoxylon* spp.) - This is perhaps the most serious disease of aspen (poplar) in Maine and is present throughout the state. Cankers begin as sunken yellowish areas on the stem and enlarge rapidly. Bark frequently assumes a loose, blistered appearance at first then becomes gray-black and crusty as cankers age. Frequently trees break off at the point of cankers during ice, snow, or wind storms.

In 1995 this disease was reported from only 7 of 105 forest health monitoring plots but is present in most poplar stands wherever they occur within the state.

Lichens -Lichens growing on dead and dying conifers are frequently and falsely accused of having a role in tree decline and death. We had several reports in 1995 from landowners concerned about lichens, particularly in downeast Maine. Lichens certainly look as though they ought to be parasitic and many people have a hard time believing that they are not. While they do grow profusely on declining and dead trees, those trees are almost certainly dying for other reasons.

Lichens are comprised of fungi and algae growing symbiotically. Since the algal component is a green plant, light is required for growth. Lichens grow more rapidly when exposed to full light, which explains their profusion on dead trees.

"Mouse" Damage (caused by several rodent species, esp. *Microtus pensylvanicus*) - Damage was much reduced during the winter of 1994-1995 compared to the previous year, which may have been the worst in two decades. We did receive a few calls regarding mouse damage, however, the most notable from Georgetown. There the owners of a year-round residence had enjoyed watching a "family" of meadow voles cavort about their front yard during the fall of 1994. They called us last summer to report mortality of heavily sheared Canadian hemlock used as a foundation planting. Close inspection revealed partial to complete girdling of stems at or near ground level, typical "mouse" damage. Suddenly the voles were no longer so "cute," and we were asked to recommend controls (traps, poisons, and destruction of habitat).

Nutrient Deficiencies - The majority of requests to us for assistance with nutrient problems come from plantation owners, particularly Christmas tree growers. But occasionally we receive homeowner calls. In homeowner situations in 1995 the most common problems arose when trees and shrubs were planted on the wrong sites. Iron and manganese deficiencies were common on limey sites, especially near concrete foundations, and nitrogen deficiencies were common on excessively drained sandy sites or where large amounts of undecomposed organic matter (especially sawdust) had been used as mulches or soil amendments.

All nutrient problems that we encounter are not born of deficiencies. Overfertilization, especially of nitrogen, is common in balsam fir Christmas tree plantations where it frequently contributes to crooked terminal shoots (leaders), excessive lammas growth, and loss of bud hardiness.

Oak Wilt (caused by *Ceratocystis fagacearum*) - To date there is no evidence that this disease occurs in Maine.

Phomopsis Galls (caused by *Phomopsis* sp.) - Every year we receive a few calls regarding the presence of galls on various species of hardwoods, especially red and black oak. These galls are often very conspicuous, ranging from the size of a pea to the size of a basketball, and are especially evident when leaves are off trees. Typically only one or two trees will be affected in the landscape, with neighboring trees apparently not susceptible. Frequently galls will cause dieback of smaller branches, but generally trees seem to tolerate infection fairly well.

This is a difficult disease to diagnose with certainty because no fungal fruiting bodies are apparent on the galls. The fungus must be cultured from infected tissue and allowed to fruit before a positive diagnosis can be made.

Little is known about the etiology of this disease and it is therefore difficult to recommend effective control actions. However we suggest that in forest stands affected trees be harvested early or as encountered to reduce inoculum. In landscape settings affected trees should be diagnosed early so that attempts may be made to prune infected tissue from trees before the disease gets out of hand.

Pine-Pine Gall Rust (caused by *Endocronartrium harknessii*) - This disease occurs in natural stands as well as forest and Christmas tree plantations in Maine. We have found it in natural stands of jack pine in such diverse locales as Parlin Pond and Steuben, and in plantations of Scotch and jack pine from all over the state. It occurs especially frequently in Scotch pine plantations, even where no nearby infection is present in the wild, as the result of planting of infected nursery stock.

Once established in a plantation this disease may be hard to manage. Removal of infected trees (or branches containing galls) early in the rotation and before the end of April each year will help keep the disease from spreading to healthy trees. It is important when establishing plantations of hard pines to plant only healthy nursery stock.

Pinewood Nematode (*Bursaphelenchus xylophilus*) - Pinewood nematode in Maine is primarily a problem of stressed trees, especially those stressed by being planted off site. But many plantations (including ornamental plantings) are in fact established off site and we suspect that pinewood nematode has played a role in the mortality of pine and perhaps other species in such situations, even though the presence of pinewood nematode was never confirmed. The pinewood nematode, which causes the most serious disease of pines in Japan (pine wilt), also occurs in the United States in all states east of the Mississippi River. Although pinewood nematode was not discovered in the United States until 1929, it is considered to be a native, not introduced, pest. There is no indication that pinewood nematode has ever caused large scale mortality of conifers in Maine or elsewhere in North America.

We have conducted limited surveys for pinewood nematode in Maine since 1983 but have found it infesting only three coniferous species: balsam fir, white pine, and red pine. However it may be present in the wood of other coniferous hosts here as well. We received no reports of this problem in 1995.

Porcupine Damage (caused by *Erethizon dorsatum*) - We had hoped that recent, high porcupine populations would decline during 1995 but if the number of calls and reports of damage we received are any indication, such was not the case. A one acre balsam fir plantation in South China was completely destroyed by porcupines over the winter; homeowners statewide called last spring with reports of heavy damage, especially to hemlock in landscape situations; and a cooperator from Hartford called to report substantial structural damage to supporting timbers under his deck due to the activity of at least four large porcupines. Loggers too reported seeing higher than usual numbers of porcupines in the woods last year.

One Christmas tree grower who had attempted to keep porcupine damage in check through intensive hunting pressure finally gave up and resorted to trapping in the vicinity of dens. This proved to be much more successful, but trapping must be repeated periodically as new porcupines occupy vacated dens.

Rhabdocline and Swiss Needlecasts of Douglas Fir (caused by *Rhabdocline pseudotsugae* and *Phaeocryptopus gaeumannii*) - No specimens of either of these diseases were submitted to us for diagnosis during 1995. That's not because there was no new infection in 1995, because there was, but it possibly reflects a lessening of interest in Douglas fir both as a landscape plant and Christmas tree species.

Many Christmas Maine tree growers lost interest in Douglas fir some time ago because of its extreme susceptibility to Rhabdocline and Swiss needle cast fungi under Maine conditions. And in the landscape not only is Douglas fir frequently attacked by these two disease fungi, but it also serves as a powerful alternate host for the buildup of Cooley spruce gall adelgid on Colorado blue spruce when it is planted nearby. So its liabilities often exceed its assets, though it does make a handsome Christmas tree when disease and adelgids are under control.

Rhabdocline and Swiss needle casts appear similar to the casual eye, and while they have slightly different life cycles, the same spray program if broadly applied will control both diseases. For more information on diagnosis and control of these and other Christmas tree pest problems, you may wish to request our Circular No. 11, Integrated Crop Management Schedule for the Production of Christmas trees.

Salt Damage (caused by movement of deicing salts from road surfaces to susceptible plant species) - Salt damage to roadside vegetation was much reduced during the 1994-1995 winter season compared to other recent years. While salt containing aerosols generated by the wheels of passing vehicle traffic caused noticeable browning of pine and hemlock foliage near high speed roadways, especially south of Portland, symptoms were less conspicuous elsewhere.

But residual symptoms of salt damage from other recent winter seasons still persist, especially to trees where salt runoff pooled in swampy areas or ran downslope over the roots of susceptible species such as white pine. Some white pines so affected still exhibit thin crowns and have yet to fully recover while others have died, often the result of bark beetle infestation of the weakened trees.

Scleroderris Canker (caused by *Ascocalyx abietina*) - No new infestations of this disease were located during 1995. This disease remains static at very low levels.

Sirococcus Blight of Red Pine (caused by *Sirococcus conigenus*) - Sirococcus blight of red pine seems to have increased in severity in Maine in recent years, especially in the Eustis-Flagstaff area, but also in plantations elsewhere in the state. Inquiries to us about this disease in managed forest areas generally fit into one of three categories: (1) infection of reproduction in thinned stands beneath infected overstory vegetation (2) infection of plantations adjacent to infested natural stands or (3) infection within new plantations which were established in locations remote from known inoculum sources, due to the use of infested planting stock.

In many areas of Maine, serious infection of red pine reproduction beneath infected overstory trees is so probable that it is not cost effective to thin stands to allow for natural red pine regeneration. However white pine seems resistant and may perform well as a regeneration species in such situations.

Infection of plantations established adjacent to infested natural stands is also highly likely, especially if tall overstory trees are left standing. Sirococcus often moves quickly into new plantations established under such circumstances, and by the time the disease is detected, it is often too late for sanitation pruning to be cost effective.

Infection of new plantations due to the use of infested planting stock is also a problem, since the disease is seed borne and seedlings are likely to be infected in nursery beds or greenhouses where container stock is produced. Use of disease free stock is paramount when establishing red pine plantations.

Sphaeropsis Blight (caused by *Sphaeropsis sapinea* syn. *Diplodia pinea*) - This disease, primarily of two-and three-needle pines, seems to have increased in severity in recent years, especially on red pine in mid-coastal areas. Plantation pines seem especially hard hit with symptoms ranging from tip blight to the death of entire trees.

Other than in older red pine plantations in coastal areas, this disease is mostly a problem in landscape plantings around homes and estates, parks, along roadsides and on golf courses. It is generally not a problem in the natural forest environment.

Spring Frost - We have received no reports of serious frost injury to gardens or forest plantations during the spring of 1995. Bud abortion of balsam and Fraser fir Christmas trees (caused by cold temperature injury prior to bud break) was also minimal.

Stillwell's Syndrome (associated with *Armillaria* spp.) - Aerial and ground surveys during 1995 showed an increased incidence of Stillwell's syndrome ("red fir") in the spruce/fir forests of northern, western, and eastern Maine. As in the past, balsam fir trees showing the sudden reddening symptoms associated with Stillwell's were found to have a very high incidence of *Armillaria* spp. root rot. A variable incidence of Stillwell's has been recorded on balsam fir since the end of the most recent spruce budworm outbreak in 1986. The incidence of Stillwell's in some forest stands of balsam fir was as high as 3 to 5 percent in the late 80's, but during the 90's rarely have more than 1 percent of the fir been affected even in heavily stressed stands. The increased incidence of Stillwell's in 1995 seems to be associated with high water levels during the spring of 1995.

Verticillium Wilt (caused by *Verticillium dahliae*) - This is primarily a disease of maples in ornamental situations but it affects other hardwood species in the landscape as well. Leaves yellow and wilt on branches of affected trees. The disease often progresses until wilt affects the entire crown. Greenish streaks or bands appear in sapwood beneath the bark. The green stain may appear as a partial or complete "ring" in the sapwood when a cut branch is viewed in cross section.

Affected trees may die or recover. Water and fertilizer may stimulate the growth of affected trees and improve prospects for recovery.

The causal fungus is soil borne, so replacing one tree which has succumbed to this disease with another susceptible species on the same site is a very risky proposition. Among trees known to be resistant to *Verticillium* include all the gymnosperms, plus apple and crabapple, mountain ash, beech, birch, butternut, oak, poplar and willow.

In 1995 we received only one report of this disease, on 'Crimson King' maple from Fort Kent.

Wet Site Problems - We received many calls during 1995, as we do every year, concerning problems with trees growing on wet sites. The most common problems we encounter on wet sites are frost heave in early years following plantation establishment, wind throw as trees achieve pole size, and slow growth throughout the rotation.

But trees on wet sites also suffer from root rots, nutrient deficiencies, low vigor, and increased susceptibility to drought. Wet sites promote shallow or surface rooting, and when drought causes water tables to drop, trees in swampy areas may suffer more than trees on drier sites which possess deeper, better developed root systems.

White Pine Blister Rust (caused by *Cronartium ribicola*) - We continue limited control efforts to manage this disease in certain high value pine stands each year, but due to funding constraints we no longer are able to cover the entire resource in a timely manner. In 1995 a total of 3,519 acres of high quality pine timber were scouted for *Ribes* plants in Cumberland, Oxford, and York counties. A total of 3,820 *Ribes* were destroyed.

White pine blister rust continues to be a problem of trees in the landscape as well, often involving trees which were infected when purchased as nursery stock. Many white pines in the trade today are dug from field situations where growers have paid no particular attention to white pine blister rust control. Blister

rust symptoms are inconspicuous for several years following infection and often growers, nurserymen and landscapers are each unaware that they are dealing with infected stock. When trees begin to die several years later, landscapers begin to search for *Ribes* nearby, often find none, then finally realize that trees may have been infected at the time of planting. Typically the homeowner blames the landscaper for the infected stock, the landscaper blames the nurseryman, and the nurseryman blames the wholesaler, and the wholesaler blames the grower! We have little expertise in resolving such disputes but we do suggest that landscapers follow the white pines that they plant for a period of several years to prune out any discolored or brown branches before the cankered area spreads to the main stem.

This disease remains static at moderate levels.

Wind Damage - Maine experienced a variety of wind events during 1995 which caused extensive damage to trees statewide.

Beginning on April 5, just when we thought winter was over, a strong arctic blast descended upon the state dropping temperatures to 15°F in south coastal sections and just below zero in the north, with wind chill factors well below zero everywhere. The front, carrying winds to 70 mph, toppled many residual trees in selectively harvested woodlots, especially conifers on sites which were excessively ledgy or poorly drained. Where the root systems were windfirm, trees often snapped or broke at crotches. The damage was so great in some recently harvested woodlots that salvage activities were warranted.

Then, during the summer, a series of microbursts (violent downdrafts of cold air associated with thunderstorms or storm fronts) uprooted trees and snapped stems in localized areas of several Maine communities.

Late fall was no kinder to Maine. On November 12, and again on November 15, violent windstorms toppled large numbers of trees, especially pole sized pine in stands which had been recently thinned. Heavy rain accompanied these windstorms and may have softened the soil sufficiently to compromise windfirmness of trees.

Storms in January 1996 continued the destruction. Damage was especially severe in Kennebec County. Blowdowns in selectively harvested areas were often so extensive that presently recommended selective harvest practices may need to be adjusted. That is the job of professional foresters, not entomologists and pathologists, but we have a few suggestions: (1) Thin stands relatively early, before stems become too crowded. Crowded trees develop restricted root systems and long, spindly stems. When trees are thinned so wind can enter a forest stand at speed, the leverage provided by crowns high in the air catching wind is more than restricted root systems can tolerate. Earlier and more frequent thinnings may increase windfirmness of residual trees by offering the opportunity for roots to develop more extensively before sails (crowns) get too high in the air. (2) Consider thinning softwoods from mixed wood stands. While the potential value of softwoods may mitigate against this recommendation, hardwoods as a group appear much more windfirm, at least during winter storms. (3) Plant nothing but well to moderately-well drained, deep soil sites. Trees must be deeply rooted to become windfirm.

Winter Injury - Symptoms of 1994-1995 winter injury to trees and shrubs were much reduced last spring over recent years. Even the relatively tender dwarf Alberta spruce came through the winter relatively unscathed, exhibiting only trace to moderate levels of foliage damage. Rhododendrons and yews were also relatively free of winter browning symptoms, as was higher elevation red spruce.

However ice damage to trees was significant, especially in southern and western Maine. Ice storms were particularly damaging to white pines, where lateral branches one to six inches in diameter were frequently broken from tree crowns to litter lawns, roadsides, and woodland areas. Sapling pines in recently harvested woodlots, newly released but still spindly, snapped in great numbers under heavy ice loads. Ice also caused significant damage in some western mountain areas, especially to yellow birch.

Forestry Related Quarantines in Maine

There are four forestry related quarantines which are in effect in Maine. They are: White Pine Blister Rust, Gypsy Moth, European Larch Canker, and Hemlock Woolly Adelgid.

I. The White Pine Blister Rust Regulations and Quarantine are listed under Title 12 MRSA 1988, Subchapter III, §803:8305 Shipment Prohibited.

The director may prohibit, prevent or regulate the entry into or movement within the State, from any part thereof to any other part, of any plants of the genus *Ribes* or other nursery or wildling plants, stock or parts of plants which may cause the introduction or spread of a dangerous forest insect or disease. The director may issue the necessary orders, permits and notices necessary to carry out this section which shall not be considered to require or constitute an adjudicatory proceeding under the Maine Administrative Procedure Act, Title 5, Chapter 375.

Regulation: White Pine Blister Rust, Quarantine on Currants and Gooseberry Bushes.

A. The sale, transportation, further planting or possession of plants of the genus *Ribes* (commonly) known as currant and gooseberry plants, including cultivated wild, or ornamental sorts) is prohibited in the following Counties in the State of Maine, to wit: York, Cumberland, Androscoggin, Kennebec, Sagadahoc, Lincoln, Knox, Waldo, Hancock, and parts of Oxford, Franklin, Somerset, Piscataquis, Penobscot, Aroostook, and Washington.

B. The planting or possession of European Black Currant, *Ribes nigrum* or its varieties or hybrids anywhere within the boundaries of the State of Maine is prohibited. This quarantine is administered by the Insect & Disease Management Division of the Maine Forest Service, phone 287-2431 or 287-2791.

II. The Gypsy Moth Quarantine is listed under 7 CFR Part 301.45, United States Department of Agriculture, Animal & Plant Health Inspection Service, Plant Protection and Quarantine as printed in the Federal Register.

A. This quarantine designates the infested area in Maine as quarantined for the movement of regulated articles, which includes wood such as logs, pulpwood, trees, shrubs, firewood, Christmas trees, and chips, and requires the inspection and certification of such material if movement is to non-infested states and foreign countries. This is administered by the USDA-APHIS, PPQ in Bangor, Maine, phone 945-0479.

B. Inasmuch as Maine is not completely infested and quarantined, wood or regulated articles moving from the infested area of the state to the non-infested area must be accompanied by a certificate or go to a mill under state compliance agreement which allows the reception of such articles. Regulated articles moving from the non-infested area of the state to other non-infested states or non-infested parts of Canada must be accompanied by a state permit stating that the regulated article originated outside of the infested area of the state. This is managed by the Insect & Disease Management Division of the Maine Forest Service, phone 287-2431 or 287-2791.

III. The European Larch Canker Quarantine is listed under 7 CFR Part 301.91 of the United States Department of Agriculture, Animal & Plant Health Inspection Service, as published in the Federal Register, and also under Title 12 MRSA, §8305 of the Laws of the State of Maine.

A. This quarantines all parts of larch (*Larix* spp.) including logs, pulpwood, branches, twigs, etc., as regulated articles.

B. Also any other product, article, or means of conveyance whatsoever, when it has been determined by an inspector that it presents a risk of spread of the disease.

C. Designates parts of Hancock, Knox, Lincoln, Waldo, and Washington Counties as the quarantined area from which movement is restricted.

This is managed by the USDA-APHIS, PPQ in Bangor, Maine, phone 945-0479, and the Insect and Disease Management Division of the Maine Forest Service, phone 287-2431 or 287-2791.

IV. The Hemlock Woolly Adelgid Quarantine is listed under 7 MRSA, Chapter 409, §2301-2303 of the Laws of the State of Maine.

This quarantine was adopted to attempt to prevent the introduction of the Hemlock Woolly Adelgid (*Adelges tsugae* Annand) into Maine. This pest has been found to cause mortality of Eastern Hemlock (*Tsuga canadensis*) in infested states. Since hemlock is a major component of Maine's forest on over one million acres, protection of this valuable resource from damage by the Hemlock Woolly Adelgid is essential.

A quarantine is established against the following pest and possible carriers.

A. Pest: Hemlock Woolly Adelgid (*Adelges tsugae* Annand).

B. Area Under Quarantine: The States of Connecticut, Delaware, Maryland, Massachusetts, New Jersey, New York, Pennsylvania, Rhode Island, Virginia, Alaska, California, Oregon, Washington, and the District of Columbia.

C. Articles and Commodities Covered: Hemlock seedlings and nursery stock, logs, lumber with bark, and chips.

D. Restrictions: All articles and commodities covered are prohibited entry into the state from the area under quarantine unless specified conditions (listed below) are met.

1. Hemlock seedlings and nursery stock are: admissible into Maine provided each lot is accompanied by a certificate issued by the Department of Agriculture or Conservation of the State of the origin with an additional declaration that said material is free from Hemlock Woolly Adelgid.

2. Hemlock logs, lumber with bark, and chips are: admissible provided that said material is only shipped to preapproved sites within Maine. Such shipments must be made under a compliance agreement between the shipper and the Maine Forest Service, Department of Conservation. If said material is shipped to other sites, it must be accompanied by a certificate issued by the Department of Agriculture or Conservation of the state of origin affirming (a) the material was grown in the state of origin, and that either (b) the material is free from Hemlock Woolly Adelgid, or that (c) the material originated from an uninfested area in the state of origin.

This quarantine is administered by the Maine Department of Agriculture, phone 287-3891 and the Insect and Disease Management Division of the Maine Forest Service, phone 287-2431 or 287-2791.

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I&DM Summary Report No. 10 - Mar. 1996

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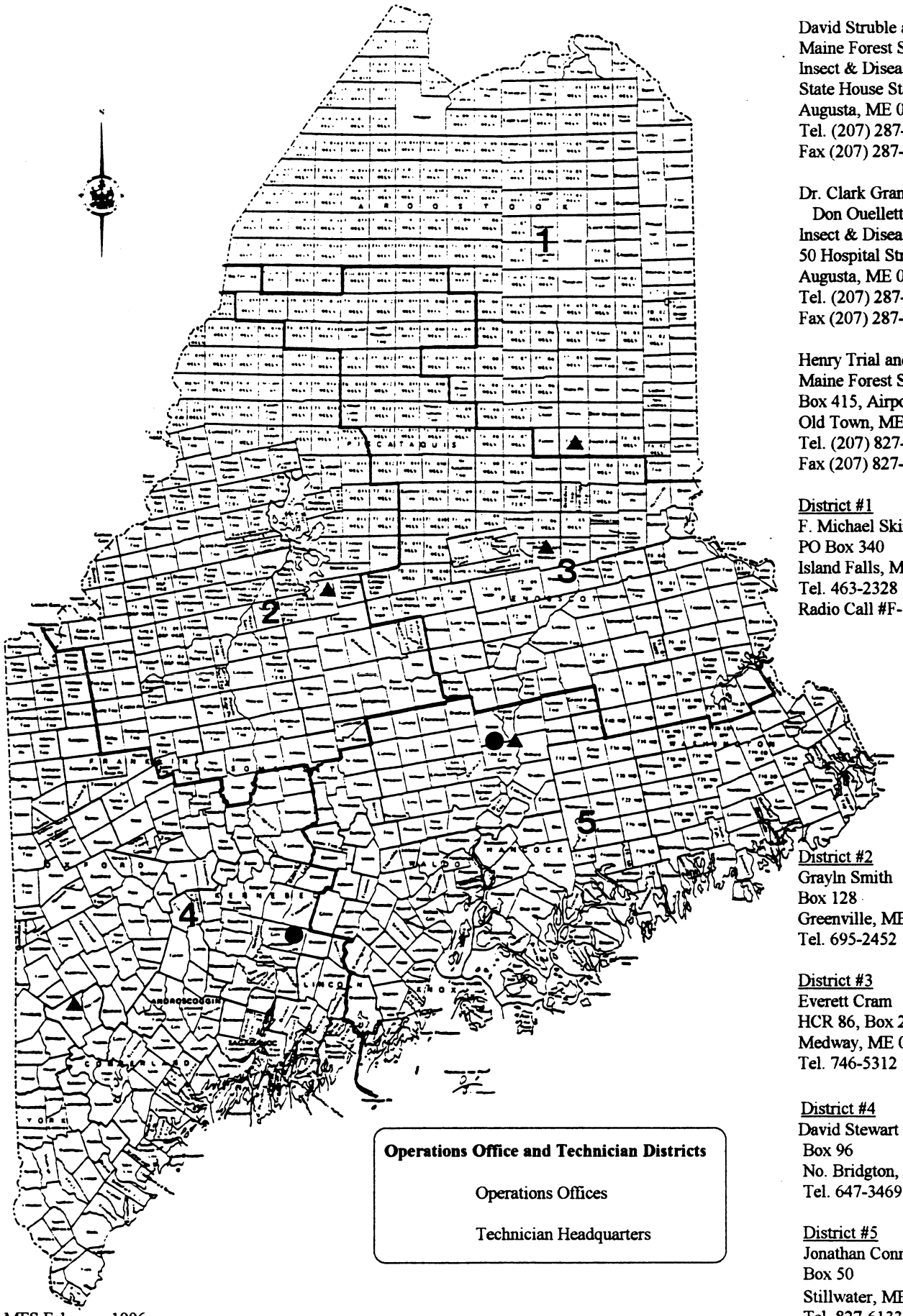

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